8.10 Traffic and Transportation

This section presents the potential effects of the project on the transportation system, including any necessary modifications to the transportation system and increase in traffic from construction and operation of the proposed generating facility. A description of the existing transportation system and levels of service (LOS) are presented, along with an analysis of potential impacts.

Section 8.10.1 discusses the existing environmental setting; Section 8.10.2 discusses the environmental effects of construction and subsequent operation; Section 8.10.3 describes the cumulative impacts; Section 8.10.4 includes any proposed mitigation measures during construction and operation; Section 8.10.5 presents applicable LORS; and Section 8.10.6 lists references used in preparing this section.

8.10.1 Affected Environment

8.10.1.1 Highways and Roads

The proposed project is located in the far eastern corner of Alameda County, approximately 8 miles northwest of the city of Tracy, 12 miles east of Livermore, 5 miles south of Byron, and less than 1 mile from the San Joaquin and Contra Costa county borders and the Mountain House Community Service District (MHCSD), a new town just starting Phase 1 construction (Figure 8.10-1).

For this analysis, the traffic study area is defined as the area bounded by Byron Bethany Road to the north and east, Kelso Road to the south, and Mountain House Road to the west. Additional roads that connect these three roads with the regional system include Grant Line Road, I-580, I-205, and State Route 4. A description of these roadways and key intersections is provided below (Figure 8.10-2).

Roadways in the Traffic Study Area.

Byron Bethany Road. This road goes by different names in different counties. For this report, it is called Byron Bethany Road. Byron Bethany Road is a two-lane roadway with 12-foot lanes and minimal paved shoulders in the traffic study area. The width of the unpaved shoulders varies throughout the corridor length. There are areas where vehicles have room to pull over onto the unpaved shoulder and areas where there is no room for this to occur. The posted speed limit on Byron Bethany Road is 55 miles per hour (mph).

Byron Bethany Road runs southeasterly from its intersection with Marsh Creek Road/ Camino Diablo in Contra Costa County to the town of Tracy. It is classified as a County Road (J4) in Contra Costa County. In Alameda County, in the East County Area Plan (ECAP), Byron Bethany Road is not shown as an Arterial. The ECAP focuses more on the transportation network in the tri-valley area (Pleasanton, Livermore, Dublin). In San Joaquin County, Byron Bethany Road is shown as a Major County Road on the San Joaquin County General Plan. The City of Tracy Circulation Plan classifies Byron Bethany Road as a two-lane rural highway.

Mountain House Road. This is a two-lane roadway with 11-foot lanes and minimal paved shoulders. The width of the unpaved shoulders varies throughout the corridor length. The length of this roadway is approximately 4 miles. The speed limit on Mountain House Road in the traffic study area is 50 mph. South of the intersection with Kelso Road there is a school zone, which reduces the speed to 25 mph when children are present.

Mountain House Road is a local road (classified by the City of Tracy Circulation Plan as a two-lane rural highway). It is shown on the Transportation Diagram of the ECAP but not as an Arterial. Mountain House Road intersects Byron Bethany Road just inside the Alameda/ Contra Costa County line and extends south to an intersection with Grant Line Road near I-580.

Kelso Road. This is a local road that runs east-west. Its eastern terminus is the intersection with Byron Bethany Road (in San Joaquin County). Kelso Road is not shown on the ECAP Transportation Diagram. Its western terminus is west of Bruns Road at the State Water Agency site. It forms intersections with Mountain House Road and Bruns Road. The speed limit is 50 mph. Kelso Road is a two-lane roadway with 10- to 11-foot-wide lanes, little or no paved shoulder, and varying width for the unpaved shoulder.

These three roadways will be the most directly impacted by construction of the linears and by traffic generated from construction and operational activities.

Intersections in the Traffic Study Area.

Byron Bethany Road and Mountain House Road (Alameda County). This intersection is a three-way intersection with Mountain House Road teeing into Byron Bethany Road. Mountain House Road traffic must stop before turning onto Byron Bethany Road. Byron Bethany Road through traffic does not have to stop. Left-turn traffic from Byron Bethany Road onto Mountain House Road has to yield to through traffic before turning. The intersection is not perpendicular. The right-turn from Mountain House Road onto Byron Bethany Road will occur at a 45 degree angle and the left-turn from Mountain House Road onto Byron Bethany Road will occur at a 135 degree angle. There are no speed change lanes or turn-lanes on Byron Bethany Road. The Southern Pacific railroad tracks are northeast of the intersection and do not affect the intersection operations.

Byron Bethany Road and Kelso Road (San Joaquin County). This intersection is also a three-way intersection with Kelso Road teeing into Byron Bethany Road. Kelso Road traffic must stop before turning onto Byron Bethany Road. The intersection is not perpendicular. The right-turn from Kelso Road onto Byron Bethany Road will occur at a 45 degree angle and the left-turn from Kelso Road onto Byron Bethany Road will occur at a 135 degree angle. There is a left-turn lane for the movement from Byron Bethany Road onto westbound Kelso Road. There are no other speed change lanes or turn-lanes on Byron Bethany Road.

Kelso Road and Mountain House Road (Alameda County). This is a four-way, perpendicularly aligned intersection with Kelso Road traffic required to stop at the intersection. Mountain House Road traffic is allowed to pass through without stopping. There are no exclusive turn lanes at this intersection.

No other public intersections are located within the traffic study area.

8.10.1.2 Truck Routes, Weight, and Load Limitations

During a visual inspection on November 3, 2000, no signs listing truck restrictions were observed on Byron Bethany Road, Mountain House Road, or Kelso Road. According to Mr. Fil Uy at Contra Costa County Transportation Department, the traffic flow on Byron Bethany Road consists of approximately 15 percent trucks.

The California Department of Transportation (Caltrans) weight and load limitations for state highways applies to all state and local roadways. The following provisions, from the California Vehicle Code, apply to all roadways and are therefore applicable to this project.

General Provisions:

- The gross weight imposed upon the highway by the wheels on any axle of a vehicle shall not exceed 20,000 pounds and the gross weight upon any one wheel, or wheels, supporting one end of an axle, and resting upon the roadway, shall not exceed 10,500 pounds.
- The maximum wheel load is the lesser of the following: (a) the load limit established by the tire manufacturer, or (b) a load of 620 pounds per lateral inch of tire width, as determined by the manufacturer's rated tire width.

Vehicles with Trailers or Semitrailers:

- The gross weight imposed upon the highway by the wheels on any one axle of a vehicle shall not exceed 18,000 pounds and the gross weight upon any one wheel, or wheels, supporting one end of an axle and resting upon the roadway, shall not exceed 9,500 pounds, except that the gross weight imposed upon the highway by the wheels on any front steering axle of a motor vehicle shall not exceed 12,500 pounds.

Truck traffic percentages are not available from any of the three counties for the non-state roadways in the traffic study area. Caltrans provides average daily traffic (ADT) truck count information for I-205, I-580, and State Route 4:

- On I-205 in 1998, the ADT was 81,000 just east of the interchange with I-580 and the number of trucks was 11,200 (14 percent).
- On I-580 in 1998, the ADT was 103,000 just west of the interchange with I-205 and the number of trucks was 12,900 (12.5 percent).

Public Transport Systems. The site is rural and undeveloped for public transportation. While some public transportation passes through the area (primarily down Byron Bethany Road), there are no separate bus, rail, light rail, or other public transportation facilities in the vicinity (Figure 8.10-2).

8.10.1.3 Traffic Volumes

Traffic count data for the project area vary in quality and coverage. Because of the rural conditions and relatively small roads there have been relatively few data collected. Caltrans provides data only for the State Highways. Data from Caltrans, the counties, and studies performed for the Mountain House EIR (Baseline, 1994) are described below and shown on Figure 8.10-3.

Alameda County. Alameda County does not provide any count data for the study area as it is on the eastern fringe of the county and more attention is focused on the west. The ECAP does not provide traffic count data for these areas either.

Contra Costa County Transportation (Contra Costa County Transportation). Mr. Fil Uy with the Contra Costa County Transportation Department provided the following information on Byron Bethany Road just west of the Alameda-Contra Costa County line. The 1999 ADT was 13,820 vehicles. The AM peak hour (7:00 to 8:00) volume was 1,200 with 730 vehicles traveling in the northwest direction and 470 vehicles traveling in the southeast direction. The PM peak hour (4:30 to 5:30) volume was 1,060 with 540 vehicles traveling in the northwest direction and 520 vehicles traveling in the southeast direction.

These volumes represent a peak hour percent of 9 percent during the AM peak hour and 8 percent during the PM peak hour.

San Joaquin County. San Joaquin County does not conduct traffic counts on highways unless the count is directly related to a specific project (Chahal, 2000). Their most current counts were taken in 1990 and are published in the 1992 San Joaquin County Transportation Plan. The counts for Byron Bethany Road and Kelso Road at the San Joaquin/Alameda County line are summarized in Table 8.10-1.

TABLE 8.10-1
Average Daily Traffic Volumes from 1992 San Joaquin County Transportation Plan

Roadway	1976	1980	1985	1987	1990
Byron Bethany Road	2,300	2,500	3,900	4,400	5,700
Kelso Road	NA	NA	NA	NA	700

By comparing the 1990 count on Byron Bethany Road with the 1999 count from Contra Costa County, it can be seen that traffic has grown by 143 percent during this 10-year period or 10 percent annually.

Growth on Byron Bethany Road appears to be the result of increased travel between the San Francisco Bay Area/East Bay Area and the Central Valley. Byron Bethany Road is a key connecting roadway that accommodates these trips.

Kelso Road and Mountain House Road are local roadways that typically serve traffic traveling to and from property along these roadways. Increases in land use activity, and therefore traffic demand, along Kelso Road and Mountain House Road have been minimal. To facilitate the traffic analysis, a growth rate of 2 percent per year for these roadways is estimated on the basis of historical trends. No traffic count data were provided for Mountain House Road. Given that it is the westernmost road in the study area that connects Byron Bethany Road with Grant Line Road (and therefore serves as an indirect link between State Route 4 and I-205/I-580), it is assumed that its 1990 volume was slightly less than Grant Line Road in 1990 (the Grant Line Road volume was 1,800 in 1990, it is assumed that the Mountain House Road volume in 1990 was 1,500) and that its annual growth rate is 2 percent per year.

Based on these assumptions, the traffic volumes for these two roads in 1999 are estimated as listed in Table 8.10-2.

TABLE 8.10-2
Estimated 1999 Average Daily Traffic Volumes for Mountain House Road and Kelso Road

Roadway	1990	1999	Annual Rate (%)	Percent Increase 1990-1999
Mountain House Road	1,500	1,800	2%	20%
Kelso Road	500	600	2%	20%

Table 8.10-3 summarizes the 1999 roadway traffic conditions in the project vicinity. The table lists peak hour volume, peak hour capacity, volume to capacity ratio, and LOS.

TABLE 8.10-3
1999 Volume Capacity Ratio and Level of Service

Roadway	1999 Peak Hour Volume	Peak Hour Capacity	Volume-Capacity Ratio	Level of Service
Byron Bethany Road	1,200	2,040	0.59	D
Mountain House Road	144	2,040	0.07	A
Kelso Road	48	2,040	0.02	A

Peak Hour Volumes were calculated by identifying the percentage of daily traffic that occurred during the hour with the highest volume of traffic. For this study, the peak hour percentage is 8 percent.

The capacity of two-lane rural highways under ideal conditions (high design speed, 12-foot lanes, clear wide shoulders, no 'no-passing' zones, all passengers cars, 50/50 directional split, and level terrain) is 2,800 passenger cars per hour total in both directions. For Byron Bethany Road, Kelso Road, and Mountain House Road, this value was decreased because of the lack of clear wide shoulders and the presence of truck traffic, according to the Highway Capacity Manual criteria.

The volume capacity ratio was calculated by dividing the peak hour volume by the peak hour capacity.

The LOS concept uses qualitative measures that characterize operational conditions within a traffic stream. Levels of service are defined and given letters from A to F, with LOS A representing the best operating conditions and LOS F the worst. For two-lane highways such as these, Table 8-1 from the 1997 Highway Capacity Manual was used (Level of Service for General Two-Lane Highway Segments) to determine LOS based on the calculated volume-capacity (VC) ratios.

8.10.1.4 Accident Rates

Accidents are generally expressed in terms of accident rate, where accident occurrence is indexed to the amount of traffic using a given roadway. For major roadway segments, accident rates are computed as the number of accidents per million vehicle-miles of travel (MVM). Accident information for routes serving the EAEC was evaluated to assess if any of the routes were identified as High Accident Locations (HAL).

These routes include:

- Byron Bethany Road (in Alameda, Contra Costa, and San Joaquin counties)
- Mountain House Road (in Alameda County)
- Kelso Road (in Alameda and San Joaquin counties)
- Grant Line Road
- I-580 (near Grant Line Road)
- I-205

Table 8.10-4 provides accident history information for these routes.

TABLE 8.10-4
Accident History

Roadway	Section	Number of Accidents		Accident Rate
		3-Year Total	Average Per Year	MVM
Byron Bethany Road	Entire Length	116	39	0.6
Mountain House Road	Entire Length	39	13	5.3
Kelso Road	Entire Length	6	2	2.6
Grant Line Road	Entire Length	131	4	10.4
U.S. 205[a]	1-Mile Section	45	15	0.72
U.S. 205	1-Mile Section	23	8	0.70

[a] U.S. 205 data are used for 580

The average accident rate for the state is approximately 3 per MVM, with a wide range of variability. From these data, it is evident that the accident rates on Mountain House Road and Grant Line Road appear to exceed the state average.

The following summarizes the three year accident history at the intersections of the study roadways:

- Byron-Bethany Road at Mountain House Road - total of 7 reported accidents; 1 year average 2.3
- Mountain House at Grant Line Road - total of 15 reported accidents; 1 year average 5
- Mountain House Road at Kelso Road - total of 12 reported accidents; 1 year average 4
- Byron-Bethany Road at Grant Line Road - total of 19 reported accidents; 1 year average 6.3

The number of accidents at the intersections is not excessive and would generally not meet Manual of Uniform Traffic Control Devices (MUTCD) warrants for signal installation if accidents could have been prevented. Accident rates reported on I-205 are generally below averages for interstates.

According to County staff, the main problems on Grant Line and Mountain House roads is excessive speed on rural two-lane roads. County staff indicated they have attempted to reduce accidents through increased enforcement, and have also considered speed bumps and stop lights. The latter have not been implemented because of the potential to cause even more problems. Implementation of the project would not exacerbate the problem of excessive speed, partly because project traffic volumes are low, and truck traffic associated with construction has the effect of reducing average speeds. As traffic volumes increase with increased growth of the Mountain House development, it is anticipated that average speeds will be reduced by congestion. While this would remain a concern, the accident rate would be expected to decrease.

Potential for Accidents During Construction. During construction, when traffic volumes are highest, traffic is expected to use both Mountain House Road and Byron Bethany Road to access the site. The impact of construction traffic on accident potential should be minimal. A traffic control plan during construction can identify preferred routes for workers access. To ensure safe access to the site of trucks, flaggers can be located at the entrance of the site.

Potential for Accidents During Operations. During operations, traffic from EAEC is minimal and should not impact accident potential on either Mountain House Road or Byron Bethany Road. Delivery trucks will follow prescribed delivery routes to further mitigate impacts of trucks on accident potential.

8.10.1.5 Transportation Improvements

This section describes transportation improvements as listed in various local planning documents (see Figure 8.10-4).

City of Tracy General Plan.
Byron Bethany Road. This plan proposes to widen Byron Bethany Road, from Patterson Pass to Grant Line Road from four to six lanes. Note that this widening has not been previously planned by the cities or the county and may not be possible. Also, this improvement would be required if the pending Mountain House Community is fully realized.

Mountain House General Plan 2010. This plan shows a roadway network of north-south and east-west roadways that are classified in the plan as Minor Arterials that would complement the Major Arterials of Byron Bethany Road, Patterson Pass, and Grant Line Road.

East County Area Plan. The ECAP does not propose any roadway improvements for the project transportation study area.

San Joaquin—2000 Regional Transportation Improvement Program (RTIP). This plan proposes the same improvements and qualifiers as described in the City of Tracy General Plan.

Contra Costa—2000 General Transportation Plan Update. The Contra Costa County geography defines the travel corridors that serve the county. The Contra Costa Transportation Agency (CCTA) has identified six corridors with a unique set of issues and varied approaches for improving mobility in each corridor. The corridors that are adjacent to the East Altamont County Area are State Route 4 East and the I-580 through the tri-valley. These are both more than 10 miles from the project site and likely to be unaffected.

The State Route 4 Central/East Corridor. This route is made up of a broad set of roadways and transit facilities that serve travel from I-680 in the west through Central and East County and then south to the tri-valley (San Ramon-Pleasanton-Dublin-Livermore area) and San Joaquin County. Many projects are programmed to assist the east-west commute through Antioch and Pittsburg. However, commuters traveling to jobs in the tri-valley or from homes in the Central Valley would prefer a more direct route to the south or southeast.

In addition, truckers looking for more direct or less congested routes into Contra Costa County are using Byron Bethany Road and State Route 4 more frequently.

Currently, routes to the south or southeast are limited to Vasco Road and Byron Bethany Road, both of which are two-lane roadways developed to rural highway standards.

A list of projects and programs within the State Route 4 East Corridor is shown below.

Track 1 of the Regional Transportation Plan.

- Express Bus Service—Add or expand express bus commuter service using Byron Bethany Road and Mountain House Road.
- Arterial Improvements—Extension of W. Leland Road and Byron Bethany Road.

Other Future Projects.

State Route 4 East Commuter Rail. On UP tracks from Bart at Bay Point with stations at Bart, Antioch, and Brentwood, connected with Altamont Commuter Express (ACE) service in Tracy.

Route 239 Interregional Corridor Study. This is a major corridor study to consider scope, alignment, interconnections of Route 239 linking Brentwood and Tracy.

Byron Bethany Road. There are planned improvements between Marsh Creek Road and Tracy. The extent of these improvements is not currently defined.

I-580-Tri Valley Corridor, CCTA**—**I-580 has become the preeminent truck route in the Bay Area, carrying more trucks each day than any other roadway in the area. Congestion at Altamont Pass has encouraged commuters to exit at Patterson Pass Road although there is a clear limit to the amount of traffic that this road can carry. In addition, the steepness of Altamont Pass limits expansion as do limited funding. The ACE rail service between Central Valley and tri-valley and East and South Bays has had real success in drawing commuters out of their cars.

Besides carrying growing numbers of commuters, the corridor also carries more trucks than any other corridor in the Bay Area. I-580 provides the most direct route from I-5 and the Central Valley to the Port of Oakland, Silicon Valley, and other industrial and business sites compared to any other route. While truckers often shift their travel times to the ‘shoulders’ of the peak periods—that is, before the morning peak, after the evening peak, or during mid-day—to avoid congestion, such a shift is not always possible. The presence of so many trucks places even greater demands on the freeway and encourages diversion to alternative routes such as Byron Bethany Road.

The strategies in the tri-valley are consistent with the development of the proposed SR 239 Interregional Corridor Study that will evaluate design strategies for constructing an expressway that links Brentwood and Tracy. This study is also consistent with the I-580/Altamont Pass Corridor Study which recommended such an expressway to provide an alternate route to I-580 for truck traffic into the East Bay.

8.10.1.6 Public Transportation

The tri-delta transit system provides bus service along the State Route 4 corridor between Bay Point and Brentwood. It provides direct links to BART.

A Park-and-Ride lot is provided at the interchange of Grant Line Road and I-580. Approximately 50 cars were parked at this location on November 3, 2000.

The ACE provides rail service between the San Joaquin Valley and the South Bay. Future transit plans include adding a commuter rail system between the BART Station at Bay Point and the ACE in Tracy. This system would run parallel to Byron Bethany Road.

8.10.1.7 Bicycle Facilities

According to the San Joaquin plan, the highest priority for the construction of bicycle facilities should be given to projects that are designed to improve the safety of existing facilities.

8.10.1.8 Railroad Operations

The Southern Pacific railroad line does not have any at-grade crossings of public roadways in the traffic study area.

8.10.1.9 Project Description and Access

Generating Facility. Access to the facility site will be from Mountain House Road, which connects to Byron Bethany Road and to Kelso Road. Kelso Road is an east-west direction and is also accessible from Byron Bethany Road from the east. Byron Bethany Road is accessible from I-205 via a connection with Grant Line Road.

Workers and deliveries traveling from the east or west on I-205 will access the site via the Grant Line Road interchange. They will travel approximately 7 miles on Grant Line and Byron Bethany roads to the site at Mountain House and Byron Bethany roads. Workers traveling from north Contra Costa County would access the site via Byron Bethany Road. The reverse will be applicable for traffic exiting the project for Byron Bethany Road.

Gas Pipeline. Natural gas for the project will be delivered via approximately 1.5 miles of new pipeline that would connect to PG&E's main pipeline, located west of the project site. Workers will commute to the project site and from there will drive work vehicles to and from their work location. The pipeline would be constructed with a minimum of one continuous "spread" working concurrently. A spread consists of equipment adequately staffed to handle the various types of activities associated with pipeline construction. Additional crews will be used for road crossings.

Electric Transmission Line. The proposed project includes construction of approximately 0.5 miles of 230-kV electric transmission line. The proposed line will be routed aboveground, directly south from the project site and connect with the existing MID/TID line located south of Kelso Road.

8.10.2 Environmental Effects

8.10.2.1 Significance Criteria

Under CEQA Guidelines Appendix G Environmental checklist, a project will normally have a significant impact if it will "cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system," or:

- Exceed a level of service standard established by the County congestion management agency for designated roads or highways.
- Result in a change in air traffic patterns.
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections or incompatible uses (e.g., farm equipment).
- Result in inadequate emergency access.
- Result in inadequate parking capacity.
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., turnouts, bicycle racks).

The following section indicates that this project will not have a significant impact due to forecast traffic demand.

8.10.2.2 Impacts Analysis

Two scenarios are analyzed for this evaluation:

- Scenario 1—The travel demand generated during the peak 2-month construction period when it is estimated that 400 employees will be working at the site and when 40 truck deliveries will be made each day.
- Scenario 2—When the plant is operational and a peak employee load of 40 employees occurs at the site and five truck deliveries per day occur.

8.10.2.3 Construction-Phase Impacts

Construction of the proposed facility, including the generating facility, gas pipeline, and electric transmission line, will take approximately 22 to 24 months. It is anticipated that the onsite construction workforce required to build the project will be drawn from the local labor pool. Byron Bethany, Mountain House, and Kelso roads are likely to be the primary roadways used to go to and from the project site. At the peak of construction, a total workforce of less than 400 workers per day will commute to the site. These workers would be distributed between Mountain House Road and Byron Bethany roads as the primary access to the site. The following sections describe potential impacts.

Generating Facility. Construction of the generating facility is expected to take 22 to 24 months. The peak workforce at the generating facility site will be approximately 400 persons, with an average workforce of 125 persons. Using an average automobile occupancy of 1.2 persons per vehicle during commute hours, construction traffic during the p.m. peak hour will result in approximately 128 additional daily trips under the worst case.

From Byron Bethany Road, direct access to the site would be from Kelso Road or Mountain House Road. A construction/access road would be built approximately 400 feet from Mountain House Road to the construction laydown area on the north side of the construction site.

Increased construction traffic will consist of truck deliveries of plant equipment and construction materials such as concrete and steel. Truck deliveries will occur between

8:00 a.m. and 4:30 p.m. on weekdays. In total, approximately 4,451 truck deliveries are expected over the 22- to 24-month period, with an average of about 10 deliveries per weekday. An average of 26 trucks per weekday are expected during the months with the highest truck traffic, resulting in an additional 52 daily trips. All deliveries will be along Mountain House Road, using Byron Bethany Road. It is anticipated that truck deliveries will include:

- Equipment, at 27 percent
- Piping, supports, and valves, at 10 percent
- Concrete and reinforcing steel, at 33 percent
- Miscellaneous steel, roofing, and siding, at 4 percent
- Administration and warehouse buildings, at 1 percent
- Construction consumables, at 16 percent
- Office supplies, at 2 percent
- Contractor mobilization and demobilization, at 2 percent
- Construction equipment delivery and pickup, at 5 percent

There are numerous pieces of heavy equipment that due to their weight must be transported to the site by rail. The equipment and total weight of the components to be transported include the main components of the CTG (330,000 lb), HRSG (320,000 lb), STG (300,000 lb), main transformers (375,000 lb), and auxiliary boiler (250,000 lb). These components may be shipped by rail to the site, or to Tracy, and delivered from Tracy by heavy truck.

Scenario 1. According to the construction schedule, there will be 2 months when there are 400 employees per day at the site. With an average vehicle occupancy of 1.2, this results in approximately 410 vehicle round trips. Additionally, 40 daily deliveries are assumed during these 2 months for a total round trip volume of 450 trips.

Also, it is assumed that travel demand in 2001 increases at the same yearly rate as was assumed between 1990 and 1999. Table 8.10-5 displays the traffic volumes, VC ratios, and LOS with EAEC trips not included.

TABLE 8.10-5
2001 Traffic Volumes, Volume Capacity Ratio, and Level of Service

Roadway	1999 Peak Hour Volume and Annual Growth Rate	2001 Volume	2001 VC Ratio and LOS
Byron Bethany Road	1,200, 10 pct	1,452	0.71, LOS E
Kelso Road	48, 2 pct	150	0.02, LOS A
Mountain House Road	144, 2 pct	50	0.07, LOS A

To calculate the impact of the site traffic, it is assumed that the traffic approaches the site from the following locations:

- From Eastern Contra Costa County—via Byron Bethany Road with turns at the Byron Bethany Road-Mountain House Road intersection.
- From Tracy and Central Valley Area—via Byron Bethany Road with turns at Kelso Road or Mountain House Road.

- From San Francisco Bay Area—via I-580/I-205 using the Grant Line Road interchange and passing through the Grant Line Road/Mountain House Road intersection and the Mountain House Road/Kelso Road intersection.

To estimate impacts of this traffic on the roadway system, it is assumed that no more than one-half of the peak trips (225) approaches from any one of these directions, based on current worker distribution. Also, it is assumed that no more than 200 of these vehicles would approach from any one direction during the peak hour, consistent with current traffic patterns. Therefore, the performance of these key roadways and intersections will be analyzed for an increase of 200 vehicles over the values in Table 8.10-4.

The performance is assessed based on methodologies described in the 1997 Highway Capacity Manual. For roadway segments, the procedures described in Chapter 8 (Two Lane Highways) are used. For unsignalized intersections, procedures that measure potential capacity[1] as described in Chapter 10 are used.

EAEC and East Contra Costa County via Byron Bethany Road.

Byron Bethany Road. If 200 vehicles are added to Byron Bethany Road in the peak hour, the VC ratio becomes 0.86 and LOS E is maintained.

Mountain House Road. If 200 vehicles are added to Mountain House Road between the site access drive and Byron Bethany Road, the VC ratio becomes 0.17 and the LOS is B.

Intersection of Byron Bethany Road and Mountain House Road. Assume that all 200 vehicles are making a right-turn onto southbound Mountain House Road from southeast-bound Byron Bethany Road or a left-turn from northbound Mountain House Road onto northwest bound Byron Bethany Road. According to Chapter 10 of the Highway Capacity Manual, the capacity for the left-turn from Mountain House Road onto Byron Bethany Road is 200 vehicles. Byron Bethany Road traffic passing through the intersection would not be impacted by this increase in demand. Mountain House Road traffic desiring to make this left-turn would queue up on Mountain House Road as the vehicle at the head of the line would have to wait for an acceptable gap to make the left-turn. Due to the short-term nature of this potential high demand for this left-turn, no investment in mitigation measures should be made at this intersection. If demand becomes too high and causes significant levels of queuing, traffic could be diverted to the Byron Bethany Road intersections at Kelso Road or Bruns Road.

EAEC and Tracy Area via Byron Bethany Road.

Byron Bethany Road. If 200 vehicles are added to Byron Bethany Road in the peak hour, the VC ratio becomes 0.86 and LOS E is still achieved.

Kelso Road. If 200 vehicles are added to Kelso Road in the peak hour, the VC ratio becomes 0.12 and LOS A is still achieved.

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[1] The potential capacity is a function of conflicting flow, expressed as an hourly rate, as well as a function of the particular minor-street movement being analyzed.

Mountain House Road. If 200 vehicles are added to Mountain House Road the VC ratio becomes 0.17 and the LOS is B.

Intersection of Byron Bethany Road and Kelso Road or Mountain House Road. This intersection has a protected left-turn for traffic turning from Byron Bethany Road onto Kelso Road. Potential capacity of this left-turn is 500 vehicles per hour (vph). The same capacity exists if these vehicles make the left-turn from Byron Bethany Road onto Mountain House Road; however, there is no protected left-turn lane.

Intersection of Mountain House Road and Kelso Road. The potential capacity for the right-turn from Kelso Road onto Mountain House Road is 900 vph and the capacity for the left-turn from Mountain House Road onto Kelso Road is 1,500 vph.

EAEC and San Francisco Bay Area.

Mountain House Road. If 200 vehicles are added to Mountain House Road the VC ratio becomes 0.17 and the LOS is B.

Intersection of Grant Line Road and Mountain House Road. The potential capacity for the left-turn from Grant Line Road onto Mountain House Road is 1,500 vph. The potential capacity for right-turn from Mountain House Road onto Grant Line Road is 800 vph.

Scenario 2. It is expected that the peak number of workers traveling to and from the EAEC site once the plant is operational will be 40. This travel demand will not cause any noticeable impacts to the highway system, and therefore does not require more extensive analysis.

8.10.2.4 Construction Impacts

Construction of the EAEC, including the generating facility, water and gas pipelines, and electric transmission line, will take approximately 22 to 24 months.

Several types of construction will be involved:

- Road Crossings—This type of construction involves trenching, stringing, welding, radiographic inspection, coating, lowering-in, and backfilling activities that will be completed as a single construction activity; street repair (if necessary); hydrostatic testing; and cleanup.
- Horizontal Directional Drilling—This type of construction involves locating the drill rig, stringing pipe, welding, radiographic inspection, placing pipe on roller, coating, pre-testing pipe, drilling the pilot hole, reaming (hole opening), pulling-back, hydrostatic testing, cleanup, and drilling mud disposal.

Access to the pipeline construction areas will be along existing roads and rights-of-way. Damage to existing roads by construction activity will be repaired to original, or as near to original condition, as possible.

Construction of the proposed linears includes crossings of Byron Bethany Road, Mountain House Road, and Kelso Road. They also include construction along the roadway segments. Because Byron Bethany Road has significant traffic volumes, closures of lanes are not recommended as this would trigger safety and performance concerns. Traffic volumes on Kelso Road and Mountain House Road are low enough to establish single-lane closures and traffic control without flaggers without degrading performance.

During each road crossing, through access will be provided at all times. Traffic will be either directed along one-half of the roadway (where construction is underway on the adjoining half), or routed across temporary trench bridging. Access for emergency vehicles, such as fire and ambulance services to local land uses, will be maintained during construction.

All road-crossing construction activities will be in accordance with local, state, and federal regulatory requirements and specifications. Adequate barricades and lights will be provided around excavations at crossings in accordance with Caltrans "Manual of Traffic Controls for Construction and Maintenance of Work Zones" and California Vehicle Code Section 21400.

8.10.2.5 Operation Impacts

During operation, the facility would employ 40 at full staffing. The impacts of this relatively low number of staff on local roadways would be insignificant.

8.10.3 Cumulative Impacts

No definite time frame for the development of the Mountain House area has been established and the 1985 Master Plan is currently being updated. Due to the substantial infrastructure improvements that are needed prior to development of the area as described in the Master Plan, it is likely that EAEC would be in operation before much of the area was developed. The small amount of operational traffic related to EAEC will easily be accommodated by the capacity provided by these proposed infrastructure improvements.

8.10.4 Mitigation Measures

8.10.4.1 Construction Phase

The construction contractor will prepare a construction traffic control plan and implementation program that addresses timing of heavy equipment and building material deliveries, signing, lighting, placing traffic control devices, and establishing work hours outside of peak traffic periods.

Methods for mitigating potential traffic impacts caused by construction may include such activities as stationing flag persons at the access road into the site, and placing advance warning flashes, flag persons, and signage along the roadways associated with the natural gas and water pipelines. Damage to any roadways opened during construction of the natural gas or water pipelines will be repaired to or near to their preexisting condition. The construction contractor will work with the local agency's engineer to prepare a schedule and mitigation plan for the roadways along the construction routes.

It should be noted that most trip-reduction strategies are not feasible for the construction phase of the project, primarily because of the differing schedules of trades persons, and the need to transport tools and materials to the jobsite. However some staggering of the workforce might be possible.

In addition, if traffic backups at the Mountain House Road/Byron Bethany Road Intersection become significant during the peak construction period, traffic could be diverted to the Byron Bethany Road intersections with Bruns Road or Kelso Road.

8.10.4.2 Operation Phase

Truck Traffic. The following actions would avoid nuisance problems associated with truck traffic:

- Shippers of hazardous materials, including inhalation hazards, will adhere to all applicable LORS for the transport of hazardous materials.
- Shipment of hazardous materials will occur during business hours, but to the extent possible, during off-peak traffic periods. Depending on the hazardous materials, police and fire departments will be notified prior to transport of shipment.
- Shippers will maintain mufflers, brakes, and secure all loose items on trucks to minimize noise and ensure safe operation.

Employee/Other Traffic. Because the total number of trips generated by employees during peak hours is not significant, mitigation is not necessary.

8.10.5 Laws, Ordinances, Regulations, and Standards

Table 8.10-6 presents the permits and permit schedule.

TABLE 8.10-6
Permits and Permit Schedule for EAEC Traffic and Transportation

Permit	Schedule
Transport oversized or excessive loads over state highways from State Agency	Obtain when necessary, 2 hour processing time (single trip) to 2 weeks (annual trip).
Transportation permit for oversized vehicles from State Agency	Obtain when necessary, same day processing.

The LORs related to traffic and transportation are summarized in Table 8.10-7 (located at the back of this section) and described in the following subsections. Table 8.10-7 also lists the appropriate agency contact for each of the LORS

TABLE 8.10-7
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Traffic and Transportation

LORS	Document and Page	Applicability	Section Where Discussed	Agency/Contact
Federal				
Regulations for the safe transport of hazardous materials	49 CFR 397.9	Requires states to regulate transport of oversized or excessive loads over State highways.	8.10.4.1	Under states jurisdiction
State				
Transport oversized or excessive loads over State highways	California Vehicle Code Section 35780	Requires approval for a permit to transport oversized or excessive loads over State highways. Enforced by the California Highway Patrol.	8.10.2.2 8.10.5.2	Caltrans Harold Burnett (Single Trip) (916) 322-1297 Dee Garcia (Annual) (916)322-1297
Transport hazardous materials on Interstate highways	California Vehicle Code Section 31303	Requires that the transportation of hazardous materials be on state or interstate highways that offer the shortest overall transit time possible.	8.10.2.2 8.10.2.3 8.10.4.2	California Highway Patrol Sgt. Deborah Pierce (916) 445-1865
Shipping of inhalation or explosive materials	California Vehicle Code Section 32105	Requires that shippers of inhalation or explosive materials contact the California Highway Patrol and apply for a Hazardous Material Transportation License. Upon receiving this license, the shipper will obtain a handbook, which will specify the routes approved to ship inhalation hazards.	8.10.2.2 8.10.2.3 8.10.5.2	California Highway Patrol Sgt. Deborah Pierce (916) 445-1865
Requirement to have a General Plan	California Government Code Section 65302	Project must conform to the General Plan.	8.10.5.3	Alameda County Community Development Agency Darren Ranelletti Planner 399 Elmhurst St., Rm 136 Hayward, CA 94544

8.10.5.1 Federal

The federal law that applies to the EAEC project is the Hazardous Materials Transportation Act of 1974, 49 Code of Federal Regulations (CFR) 397.9, which directs the U.S. Department of Transportation to establish criteria and regulations for the safe transportation of hazardous materials.

8.10.5.2 State

State laws that would apply to this project include the following (State of California 1999):

- California Vehicle Code Section 35780 requires the approval for a permit to transport oversized or excessive loads over state highways. The project will conform to Vehicle
- Code Section 35780 by requiring that shippers obtain a Single Trip Transportation Permit for oversized loads, as required by Caltrans, for each vehicle.
- California Vehicle Code Section 31303 requires that the transportation of hazardous materials be on state or interstate highways that offer the shortest overall transit time possible. The project will conform to Vehicle Code Section 31303 by requiring that shippers of hazardous materials use the shortest route possible to and from the project site.
- California Vehicle Code Section 32105 requires that shippers of hazardous inhalation or explosive materials must contact the California Highway Patrol (CHP) and apply for a Hazardous Material Transportation License. Upon receiving this license, the shipper will obtain a handbook that will specify the routes approved to ship inhalation hazards. The project will conform to California Vehicle Code Section 32105 by requiring shippers of inhalation or explosive materials to contact the CHP and obtain a Hazardous Materials Transportation License.
- California State Planning Law, Government Code Section 65302, requires each city and county to adopt a General Plan, consisting of seven mandatory elements, to guide its physical development. Section 65302 (b) requires that a circulation element be one of the mandatory elements. The scope of a circulation element consists of the "general location and extent of existing and proposed major thoroughfares, transportation routes, terminals, and other local public utilities and facilities, all correlated with the land use element of the plan." Compliance with this section is described below under the local LORS.

8.10.6 References

Chahal, Suk. 2001. San Joaquin County Transportation. Personal Comment February 6, 2001 (209) 468-3035.

Chahal, Suk. 2000. Personal Communication. San Joaquin County Public Works. January 23, 2001.

City of Tracy, 1990. An Urban Management Plan. July 19.

San Joaquin County Ordinances, Chapter 9-1150, Roadways.

Alameda County East County Development Plan. 1994. Alameda County Planning Department.

Contra Costa Transportation Authority, 2000 General Plan Update.

San Joaquin County, 2000 Regional Transportation Improvement Program.

California Department of Transportation (Caltrans). 1997 Highway Capacity Manual, Transportation Research Board.

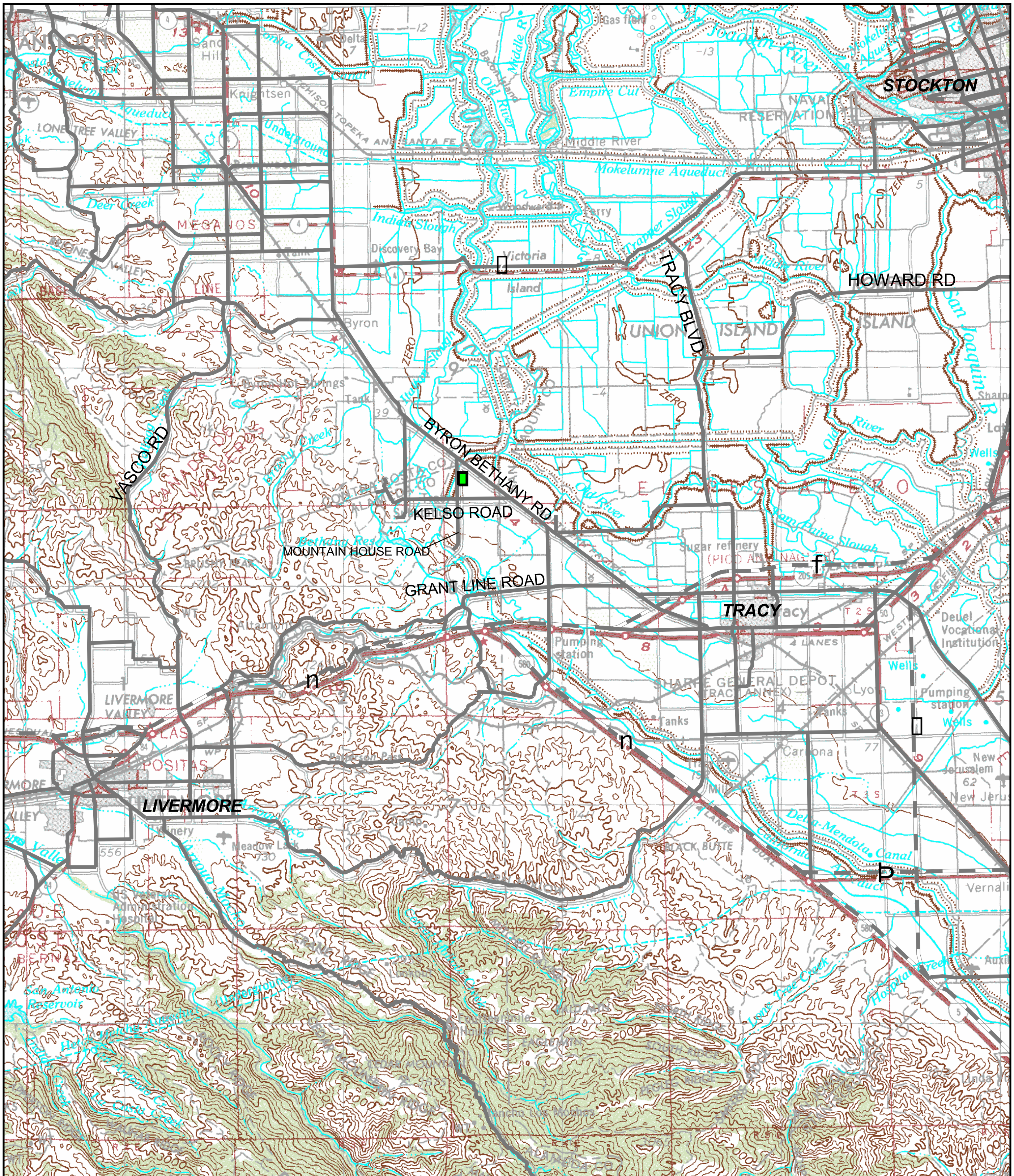
Altamont Commuter Express Web Page. (www.transitinfo.org\altamont).

Caltrans Traffic Count Web Page. (http:\\www.dot.ca.gov\hq\traffops\trksnwin\trksnwm.htm).

Preston, Bob. Alameda County Transportation Planner. Personal Comment February 7, 2001 (510) 670-5480.

Uy, Fil. Contra Costa County Transportation Planner, Personal Comment February 8, 2001 (925) 313-2262.

Uy, Fil. Personal Communication. Contra Costa County Department of Public Works January 3, 2001.



LEGEND
PROJECT SITE
PRIMARY ROAD
ROADS

N

2 0 2 Miles
1:250000
SCALE IS APPROXIMATE

FIGURE 8.10-1
Regional Transportation Corridors

APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL

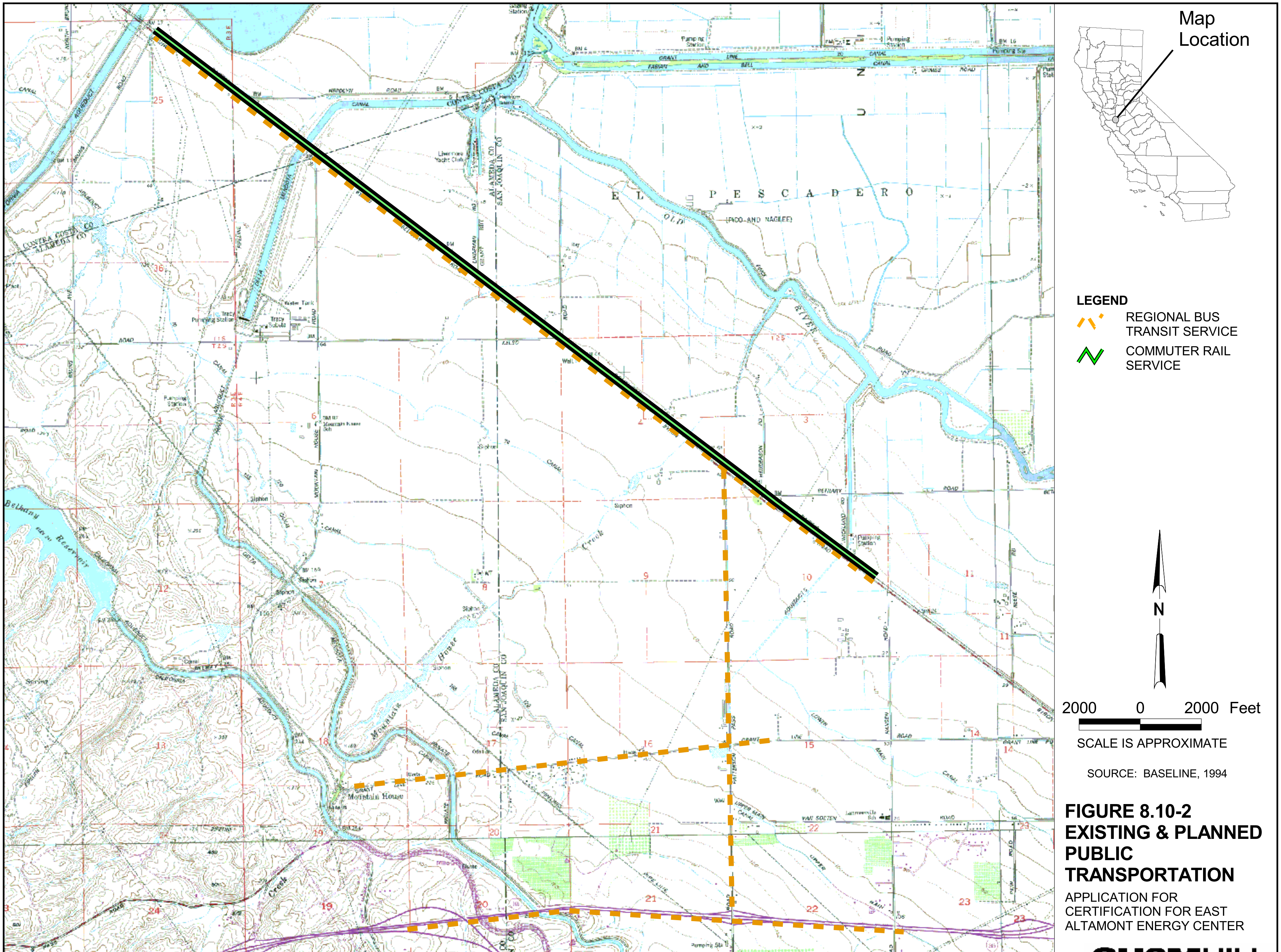


FIGURE 8.10-2
EXISTING & PLANNED PUBLIC TRANSPORTATION

APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL

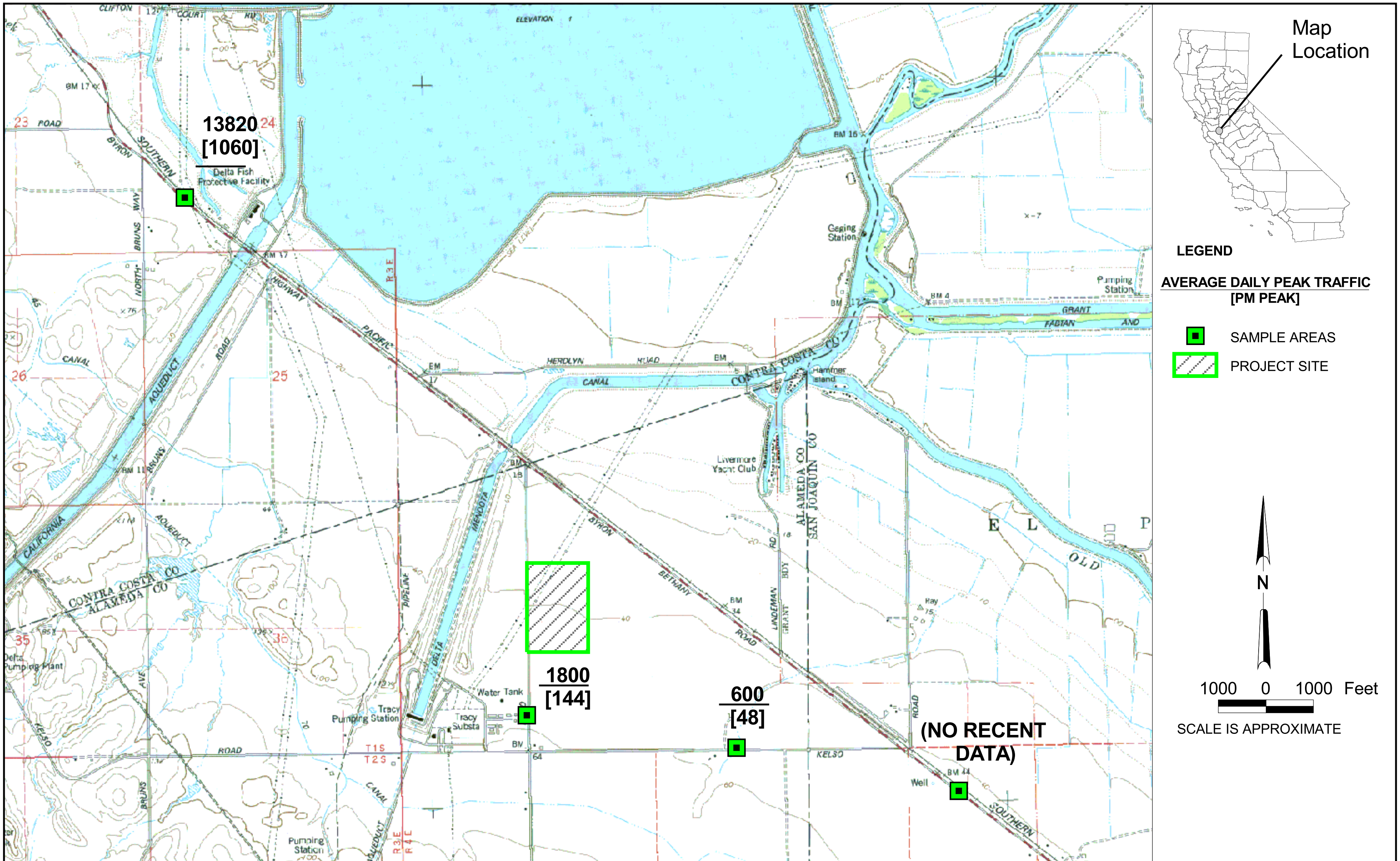
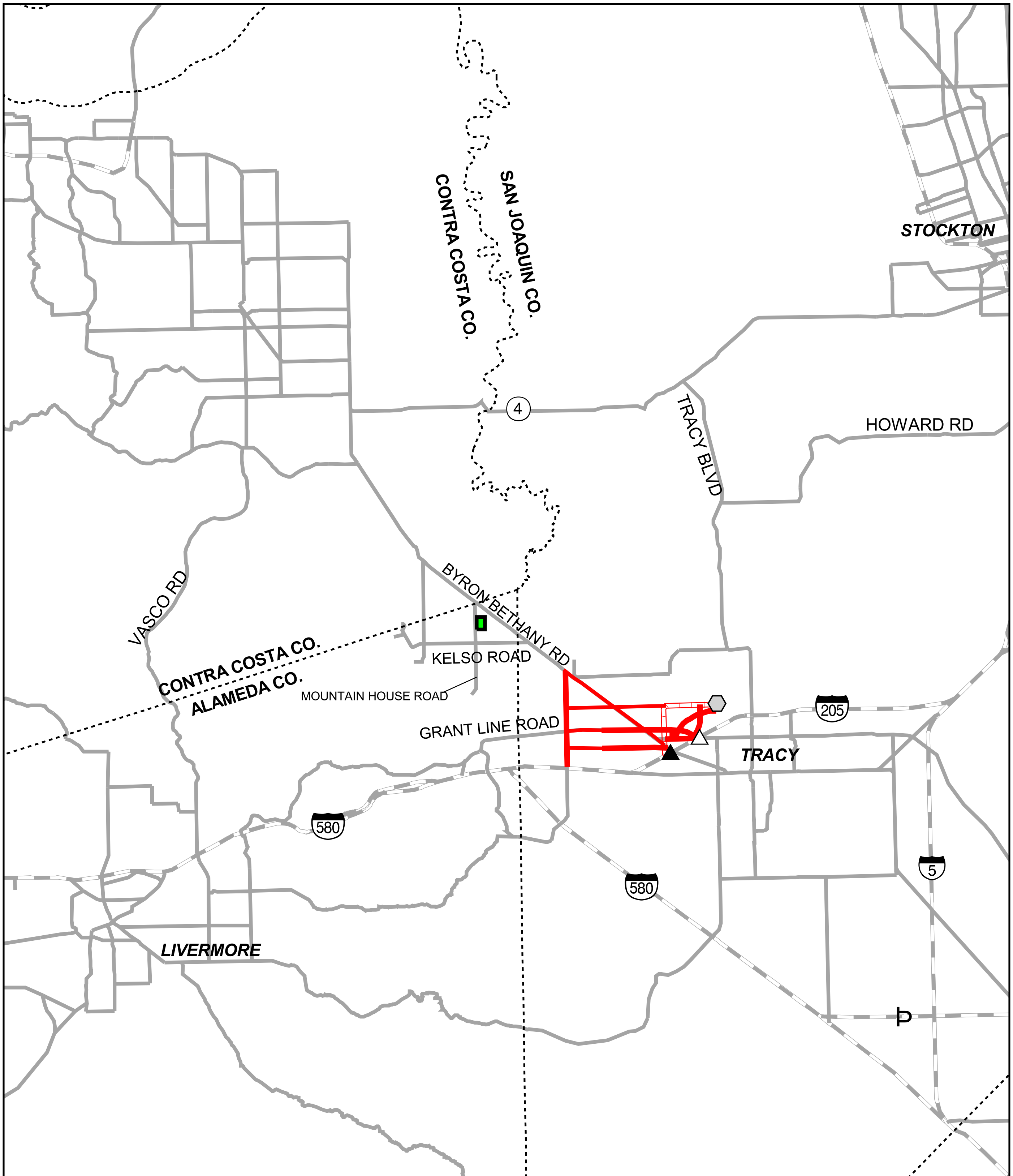


FIGURE 8.10-3
EXISTING DAILY AND P.M. PEAK HOUR TRAFFIC VOLUMES

APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL



LEGEND

- PROJECT SITE
- EXPRESSWAY
- MAJOR ARTERIAL
- MINOR ARTERIAL
- PRIMARY ROAD
- ROADS
- FREEWAY INTERCHANGE
- NEW FREEWAY INTERCHANGE
- URBAN INTERCHANGE

N

2 0 2 Miles

1:250000

SCALE IS APPROXIMATE

FIGURE 8.10-4
Future Road Improvements in Project Vicinity

APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL

CH2M Hill RDD ArcView Project File \\rddgis\east_alt\east_alt.apr 2:17 p.m. 03-13-2001

8.11 Visual Resources

Visual resources are the natural and cultural features of the landscape that can be seen and that contribute to the public's appreciative enjoyment of the environment. Visual resource or aesthetic impacts are generally defined in terms of a project's physical characteristics and potential visibility and the extent to which the project's presence would change the perceived visual character and quality of the environment in which it would be located.

This section was prepared following the CEC guidelines for preparing visual impact assessments for AFCs. Section 8.11.1 documents the visual conditions that now exist in the project area. Section 8.11.2 evaluates the implications that the proposed project would have for the public's experience of the project area's aesthetic qualities. Section 8.11.3 discusses the significance of the project impacts. Section 8.11.4 discusses the potential cumulative impacts of this and other visual projects in the area. The LORS are described in Section 8.11.5. Section 8.11.6 summarizes the mitigation measures to reduce the project's impacts on visual resources. Section 8.11.7 lists the references used in preparation of this section.

Figure 8.11-1 indicates the location of the viewpoints, viewsheds, and key observation points referenced in the section. (All figures for this section are located at the back of this section.)

8.11.1 Affected Environment

8.11.1.1 Regional Setting

Existing Conditions in the Project Vicinity. The various components of the EAEC project will be developed in the northeastern corner of Alameda County at the site indicated on Figure 2.1-1. The site is located in the small portion of Alameda County that lies to the east of the Coastal Range in an area that is a part of the San Joaquin Valley landscape zone and is on the edge of the Sacramento-San Joaquin Delta. In the vicinity of the project, the flat valley lands are generally divided into large fields used for field crops, row crops, and in some cases, grazing. Because of this agricultural pattern, the landscape has an open appearance. The openness of the landscape is punctuated in places by windrows along field edges and groves of large trees around farm dwellings. In the project area, the flat valley lands appear to extend to the horizon on the north, east, and southeast, but to the west and southwest, the views are framed by the grass and brush-covered slopes of the Coastal Range, a set of southeast-northwest trending ridges that are generally 800 to 1,200 feet in elevation, but which in places rise up to higher peaks. The most prominent Coastal Range landmarks visible from the project area are Brushy Peak, which is 7 miles to the west of the project site and 1,702 feet in elevation, and Mount Diablo, which is 19 miles northwest of the project site and 3,849 feet in elevation.

The project area's visual character reflects several layers of human use. Besides being an agricultural landscape devoted to large-scale crop production, it is also a landscape in which an unusually high number of major infrastructure facilities have been sited, creating a scene that is a mix of the rural and technological. One of the reasons the project area has such an unusual concentration of infrastructure facilities is that it lies at a critical transfer point on the California Department of Water Resources' (DWR) California Water Project and on the U.S. Bureau of Reclamation's (USBR) Central Valley Project.

The DWR's Clifton Court Forebay, located 1.3 miles north of the project site, is a shallow, 2,180-acre reservoir surrounded by a 14-foot-high dam that collects and stores water that the DWR releases from the Oroville Reservoir and transports to the Delta by way of the Feather and Sacramento rivers. From the Forebay, the water first flows through the Skinner Facility, the complex of structures at the edge of the Forebay approximately 1.9 miles north of the project site and visible from Byron Bethany Road. From the Skinner Facility, the water flows through a 138-foot-wide, 2-mile-long segment of the California Aqueduct to the Banks Pumping Plant, which is located at the base of the hills, 2.4 miles to the west of the project site. The canal is directly visible from Byron Bethany Road at the point the road crosses over it, and the high berms that line both sides of the canal are visible from a wider area.

At the Banks facility, massive pumps raise 6.7 billion gallons of water per day up 244 feet to a short canal segment that transports it 1.2 miles to Bethany Reservoir. Bethany Reservoir is a 180-acre impoundment located in the lower hills, approximately 2 miles southwest of the project site. From the Bethany Reservoir, pumps move some of the water into the South Bay Aqueduct for delivery to water agencies in Alameda and Santa Clara counties. The rest of the water flows into the California Aqueduct for transport to urban and agricultural water users in the San Joaquin Valley, the Central Coast, and Southern California.

The Central Valley Project's releases from Shasta Dam are transported to the Delta by way of the Sacramento River. At a point immediately southeast of Clifton Court Forebay, these waters are captured by the initial segment of the Delta-Mendota Canal that transports it to the Tracy Pumping Plant, which is located less than one-half mile to the southwest of the project site. The portion of the canal west of Byron Bethany Road is lined on both sides by high levees The canal passes within 1,000 feet of the EAEC site, and one of the steep-sided, grass-covered levees is prominently visible on the west side of Mountain House Road, directly opposite the project site. At the Tracy Pumping Plant, large pumps raise the water 200 feet into the continuation of the Delta-Mendota Canal, which conveys the water along the foot of the Coastal Range to the Mendota Pool south of Fresno.

Operation of the pumping plants requires large amounts of electricity, and the presence of these plants accounts in part for this area's concentration of electric facilities. Western Area Power Administration transmission lines were built to transport electricity produced at the hydroelectric plants at Lake Shasta to the large substation developed next to the Tracy Pumping Plant to provide power for the operation of the facility's pumps. This substation is located less than 800 feet from the EAEC site. The Tracy substation includes an older 230-kV facility located along Kelso Road and a newer 500-kV switchyard that borders Mountain House Road in the area immediately southwest of the project site (Photo 1, Figure 8.11-2a). To a large degree, views of the 230-kV substation equipment are screened by a thick hedge of evergreen trees that line the substation's borders along Mountain House and Kelso roads. The newer, 500-kV portion of the substation is not screened, and its dense collection of equipment, particularly the tall bus structures, is prominently visible in views from Mountain House Road and from more distant points to the east.

Three 500-kV circuits on two tall transmission structures and nine 230-kV circuits carried on five tall transmission structures radiate out of the substation complex. In addition, a pair of 500-kV lines passes through the area in a north-south direction on an alignment located approximately 1 mile west of the project site. One of these lines is carried on tubular steel poles, but the rest of the transmission lines in this area are carried on large, lattice steel towers, which are prominently visible features of the landscape (see Section 5.0).

PG&E has developed a large gas compressor station in the foothill area at the northeast corner of Kelso Road and Bruns Avenue, 1.3 miles to the southwest of the project site (Photo 2, Figure 8.11-2a). This facility includes a large building, a smaller garage structure, and several tall standpipes. The light, reflective colors of these structures cause them to contrast with the landscape backdrop, making them visually prominent elements in the landscape.

Among the most visually distinctive elements of the project area landscape are the large assemblages of wind turbines, located in the hill areas to the west and south of the project site. These turbines are located in a segment of the Coastal Range to the north and south of Altamont Pass that has been designated by the State of California as the Altamont Pass Wind Resource Area. At present, there are approximately 5,000 wind turbines in the Wind Resource Area. Most of them are horizontal axis machines with three-bladed rotors that are 50 to 60 feet in diameter and mounted on towers that range from 60 to 140 feet in height. Most of these towers have steel lattice construction, but some are mounted on single tubular steel poles. Because of their locations on hillsides and ridgetops, and because of the density of the turbines, the wind farms are highly visible and tend to dominate the landscape, particularly in near views. The wind turbines closest to the site are located approximately 1.5 miles to the southwest. From the areas around the project site, fields of wind turbines are visible elements on the hills in the middleground and background of views to the west and southwest.

Although the project area is primarily an area of large-scale agriculture and large infrastructure facilities, it also includes a small scattering of residential uses, a school, and several areas with recreational activities. The residences closest to the project site are individual farm dwellings, which are usually surrounded by outbuildings and trees. Approximately 0.75 mile northeast of the project site, an area along a small slough located south of the intersection of the Old River and the Delta-Mendota Canal has a cluster of approximately 30 small residential structures known as the Livermore Yacht Club. The residences in this area, which are built immediately adjacent to the water and are oriented toward it, appear to have been built initially as second homes, but most now appear to be used as full-time residences. In the corridor along Kelso Road 4,000 feet west of Tracy substation and the Tracy Pumping Plant and approximately 0.75 mile southwest of the site, there is another small cluster of residences. Most of these residences are located along the road, but there are also residences located on the small ridge to the north of the road and to the west of the Delta-Mendota Canal. In addition, several residences are located along the west side of Mountain House Road to the south of Kelso Road. Mountain House School, a public elementary school serving approximately 60 students, is also located in this area along Mountain House Road, approximately 1 mile south of the project site.

The Livermore Yacht Club functions as a recreational area oriented toward boating and fishing on the slough and nearby Delta waterways. The Rivers End Marina, located adjacent to the Livermore Yacht Club, provides a boat ramp, boat slips, and on-ground boat storage. At the eastern end of Clifton Court Road, approximately 2.3 miles northeast of the project site, portions of the shoreline of the Clifton Court Forebay and the California Aqueduct are open to the public for bank fishing and in season, waterfowl hunting. The Lazy M Marina, which is adjacent to this area, provides a boat ramp, berths, on-ground boat storage, a small restaurant, and cabins. At the Bethany Reservoir located 2 miles southwest of the site, the California Department of Parks and Recreation operates the 600-acre Bethany Reservoir State Recreation Area. Developed facilities include a boat ramp, dock, and picnic and parking areas. In addition, the facility serves as a staging area for a bikeway that has been developed along the segment of the California Aqueduct that extends southward from the reservoir.

Planning and Development Context. The planning policies that pertain to the project area are described in detail in Section 8.4, Land Use. The lands in the project area are designated primarily for agriculture, infrastructure facilities, and in the case of Alameda County, uses compatible with large parcel agriculture. An area in San Joaquin County located to the south and east of the site has been designated for development as a new community in the County General Plan. In the County General Plan, it is designated as the Mountain House Community Service District to be known as Mountain House. Mountain House would be developed in the 7.5-square-mile area bounded by Mountain House Boulevard (formerly Patterson Pass Road) on the east and the San Joaquin/Alameda County line on the west, and would extend from Highway 205 on the south to the Old River on the north. The community is expected to build out over the next 20 to 40 years, and when completed would have 44,000 residents and 21,000 jobs. The initial phase of this development has been approved, and construction of Neighborhood F, the first segment of the project, is expected to take place in spring 2001 in the area to the west of Mountain House Parkway at a point approximately 2.3 miles southeast of the project site.

According to adopted policies and what is known about developer plans, it appears at present that the landscape to the north, west, and south of the project site will remain generally unchanged in the foreseeable future. In contrast, it appears that in the longer term, as the neighborhoods in the Mountain House community develop, what are now open agricultural fields in the areas 0.8 mile or more to the east and southeast of the project site will be converted to developed areas of streets, homes, commercial uses, and industries. A review of the design standards in the Mountain House Plan (San Joaquin County, 1994/1998b) indicated that although the streets and open spaces in the new community are to be heavily landscaped, the environment created will have a standard suburban appearance.

The development of Mountain House has already started to have a small effect on the area's appearance. The Modesto Irrigation District is now building a 69-to 21-kV substation on Kelso Road at a point 0.5 mile west of Byron Bethany Road and 0.9 mile southeast of the project site to serve the needs of the initial phases of the Mountain House planned community. MID is the local provider of retail service to MHCSD. They will serve all MHCSD.

8.11.1.2 Project Site

Generating Facility. The site that will be used for the EAEC is a 55-acre area of flat valley land that is the middle section of a 174-acre agricultural parcel that extends along the east side of Mountain House Road from Kelso Road to Byron Bethany Road. At present, the project site is open, and is used for field and row crops and for occasional grazing. Photo 3 on Figure 8.11-2a is a view of a portion of the site from Mountain House Road, looking toward the site's northwest corner. Photo 4 on Figure 8.11-2a is a view from the site's northwest corner, looking toward the southeast. There are no structures on the project site, although an old milking shed and an agricultural equipment staging area are located on the portion of the 174-acre parcel just to the north of it. Except for seasonal crops, there is no vegetation on the site. The site is bounded on the north and south by unpaved agricultural service roads. The portion of the larger parcel that lies immediately north of the site is crossed by three parallel transmission lines comprising two 230-kV lines and one 500-kV line that are carried on lattice steel towers. A cluster of three towers is located in the area just to the north of the site's northwest corner. These towers range from 100 to 120 feet in height. On its west side, the site is bordered by a 69-kV transmission line carried on wood poles located in the right-of-way along the eastern edge of Mountain House Road. The three lattice steel towers and the wood poles carrying the 69-kV line are visible in Photo 3 on Figure 8.11-2a.

Transmission Line Route. The switchyard that will be developed adjacent to the generating facility as part of the project will be connected to the Tracy substation by the addition of new 0.5-mile-long, 230-kV double-circuit transmission lines on parallel tower structures that will follow one of two alternative alignments described in Chapter 5.0 and indicated on Figure 2.1-1. The southern portion of the 174-acre parcel that both transmission line alternatives would cross is an open agricultural field used for field and row crops. The existing MID/TID line runs parallel to Kelso Road and is located at the edge of the flat, open agricultural parcel located on the south side of the road. The southern portion of the 174-acre site and the existing 230-kV line along Kelso Road are visible in Figure 8.11-8a.

Natural Gas Line Route. The alternative routes being considered for the natural gas line that would supply the project are described in Section 2.0 and indicated on Figure 2.1-1. The preferred natural gas line route (2a) would begin near the PG&E gas compressor station located along Kelso Road at Bruns Road, 1.3 miles southwest of the project site. This route is located within the right-of-way of Kelso Road, which it follows to the project site.

Waterlines. Four alternative routes being considered for waterlines are indicated on Figure 2.1-1. All four of the alternatives begin at a point along the California Aqueduct northwest of Bruns Road, and travel along existing roads and canals through a landscape characterized by large scale agriculture and transmission lines, canals, and other major infrastructure. Two alternative routes for reclaimed wastewater are also being considered. Both would start at the wastewater treatment facility that will be developed for the proposed Mountain House Community at a location along the slough at the intersection of Wicklund and Bethany Roads. These routes (Alternatives 4a and 4b) follow the corridor along Byron Bethany Road and the Union Pacific Railroad tracks for much of their distance, and pass through a landscape characterized by large, open, agricultural fields.

8.11.1.3 Project Site Visibility

Figure 8.11-1 provides a generalized indication of the project viewshed, that is, the areas from which the proposed generating facility and transmission line would likely be visible. Because the alternative options for gas supply lines would be entirely underground and thus not visible, they were not a consideration in the creation of this map. In addition, the water and wastewater supply line options were not a consideration in the creation of this map. Five of the six alternatives would involve underground lines that would not be visible. One of the alternatives uses a surface canal that is already a visible element of the existing landscape, and its appearance would not be substantially changed if it were used to provide water to the project.

The project's viewshed was identified from engineering drawings, visual simulations of the project's appearance from representative viewpoints, study of topographic maps and air photos, and extensive field observations. The viewshed indicated on Figure 8.11-1 is generalized in that there are areas in the boundaries of the potential viewshed where views toward the generating facility might be blocked by topography, structures, trees, or other features in the viewer's immediate foreground. For example, the berm along the Delta-Mendota Canal substantially blocks views toward the site from the northwest, but areas to the northwest of the berm are included in the mapped viewshed to reflect the possibility that the plant's tallest elements may be visible from that area. In areas of the valley and hillside lands where there are open views toward the site, the proposed plant has the potential to be visible over long distances. The boundaries of the area of potential visibility were set at 3 miles from the site. This distance was selected because elements of a view that are 3 miles or more away are considered to be a part of the background, the landscape zone in which little color or texture is apparent, colors blur into values of blue or gray, and individual visual impacts become least apparent (U.S. Department of Agriculture [USDA] Forest Service, 1973).

8.11.1.4 Sensitive Viewing Areas and Key Observation Points

To structure the analysis of the project effects on visual resources, an identification was made of the view areas most sensitive to the project's potential visual impacts, and in consultation with CEC staff, six Key Observation Points (KOPs) were selected for detailed analysis. For each of the KOPs, photo simulations were developed as a basis for visualizing the plant's potential effects. In evaluating the sensitivity of the viewing areas potentially affected by the project, consideration was given to distance from the project site, numbers of viewers, and the presence of residential or recreational uses. The sensitive viewing areas selected for analysis and the views from the KOPs are described below.

All of the areas selected as KOPs lie within 0.75 mile of the project site and thus are areas in which project features would be visible in the foreground or near middleground. Although the Livermore Yacht Club lies within 0.75 mile of the site and has the single largest concentration of existing residences in the project area, with the concurrence of CEC staff, it was not designated as a KOP. Because the homes in the Livermore Yacht Club are sited below the crest of the levee, the plant site is not visible from most residences. The primary view from this area toward the project site is the view from the parking lot at the southern end of the community (Photo 5, Figure 8.11-2b). From this area, views are blocked to a large degree by intervening landscape elements. The project site is also visible from the levee road that runs along the western edge of this community (Photo 6, Figure 8.11-2b). From this road, the plant site is readily visible, but this view is not highly sensitive because, although it is the view a small number of residents see while driving out of the area, it is not visible from their residences, and it is not visible from the recreational zone along the slough.

With the concurrence of CEC staff, a KOP was not established at the recreation area at Bethany Reservoir. Because this area is 2 miles from the project site, the site is a relatively small area in the far middleground of the view from the public use areas at the reservoir. In addition, the site is seen in the context of and partially screened by an array of wind turbine structures in the foreground and the complex of electrical equipment in the Tracy substation in the middleground (Photo 7, Figure 8.11-2b). Similarly, a KOP was not established at the informal fishing areas on the banks of Clifton Court Forebay and the adjacent segment of the California Aqueduct or the nearby Lazy M Marina. This area is 2 miles distant from the project site and views toward the site are obscured by the berms along the Delta-Mendota Canal and by the presence of a large number of 500-kV transmission towers in the foreground and middleground of the view (Photo 8, Figure 8.11-2b).

In consultation with CEC staff, it was determined that analyses of the project's effects on views from the Mountain House community would not be required as a part of the AFC analysis. Because the new community does not yet exist on the ground, it is not a part of the existing environment, and therefore the visual effects of the project on it do not require analysis under CEQA.

To respond to the CEC's requirement that an assessment be made of the visual quality of the landscapes potentially affected by the project, the discussion of the views seen from the KOPs includes ratings of the visual quality of the landscapes that they represent. These ratings were developed according to a series of in-field observations carried out during the period from October through December 2000, review of photos of the affected area, review of methods for assessment of visual quality, and review of research on public perception of the environment and scenic beauty ratings of landscape scenes. The final assessment of the visual quality of the views from each of the KOPs was made on the basis of professional judgment that took a broad spectrum of landscape assessment factors into consideration. The factors considered included evaluation of the following:

- Natural features, including topography, water courses, rock outcrops, and natural vegetation;
- Positive and negative effects of man-made alterations and built structures on visual quality;
- Visual composition, including assessment of the complexity and vividness of patterns in the landscape; and
- Spatial organization, including assessment of criteria such as perceived accessibility, mystery, enclosure, scale, image, refuge, prospect, and contemplation.

The relevance of these dimensions for landscape evaluation has been established by landscape perception and assessment research that has taken place over the past 30 years[1]. The final landscape quality ratings developed based on these considerations were expressed in terms of the six landscape quality classes listed in Table 8.11-1. This rating system is based on the scale developed for use with an artificial intelligence system for evaluation of landscape visual quality developed by a group of landscape scholars at Virginia Tech (Buhyoff et al., 1994). This scale provides a robust framework for qualitative ratings because it is based on the findings of the full range of available research on the ways in which the public evaluates visual quality. In addition, the scale has a common-sense quality and is readily understandable. It defines landscape quality in relative terms, contrasting landscapes that are average in visual quality with those that are above and below average, and those that are at the top and bottom of the landscape quality spectrum.

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[1] Research literature that defines these dimensions and documents the role that they play in the perception of landscape quality includes Amadeo, Pitt, and Zube, 1989; Kaplan, S. 1979; Kaplan, R.1985; Kaplan and Kaplan, 1982; Ribe, 1989; and Shafer, et al. 1969.

TABLE 8.11-1
Landscape Visual Quality Scale Used in Rating the Areas Potentially Affected by the East Altamont Energy Center

Rating	Explanation
Outstanding Visual Quality	A rating reserved for landscapes with exceptionally high visual quality. These landscapes will be significant regionally and/or nationally. They usually contain exceptional natural or cultural features that contribute to this rating. They will be what we think of as "picture post card" landscapes. People will be attracted to these landscapes to be able to view them.
High Visual Quality	Landscapes that have high quality scenic value. This may be due to cultural or natural features contained in the landscape or to the arrangement of spaces contained in the landscape that causes the landscape to be visually interesting or a particularly comfortable place for people. These are often landscapes which have high potential for recreational activities or in which the visual experience is important.
Moderately High Visual Quality	Landscapes which have above average scenic value but are not of high scenic value. The scenic value of these landscapes may be due to man-made or natural features contained in the landscape, to the arrangement of spaces, in the landscape, or to the two-dimensional attributes of the landscape.
Moderate Visual Quality	Landscapes which have average scenic value. They usually lack significant man-made or natural features. Their scenic value is primarily a result of the arrangement of spaces contained in the landscape and the two-dimensional visual attributes of the landscape.
Moderately Low Visual Quality	Landscapes that have below average scenic value but not low scenic value. They may contain visually discordant man-made alterations, but the landscape is not dominated by these features. They often lack spaces that people will perceive as inviting and provide little interest in terms of two-dimensional visual attributes of the landscape.
Low Visual Quality	Landscapes with low scenic value. The landscape is often dominated by visually discordant man-made alterations; or they are landscapes that do not include places that people will find inviting and lack interest in terms of two-dimensional visual attributes.

Note: Rating scale based on Buhyoff et al., 1994.

KOP 1—Byron Bethany and Mountain House Roads. Figure 8.11-3a depicts the view from KOP 1. This viewpoint was selected to represent views toward the project site from the southbound lane of Byron Bethany Road and from the southbound lane of Mountain House Road. This viewpoint lies approximately 0.4 mile from the site's northern boundary, and 0.5 mile from the location of the project's closest structures. This view lies well within the cone of vision of drivers traveling south on Mountain House Road, but is at the outer edge of the normal cone of vision of drivers of vehicles traveling south on Byron Bethany Road. Byron Bethany Road is a major arterial and, as indicated in Section 8.10.1.3, has an average daily traffic (ADT) level of 13,820 vehicles per day. Observation of traffic on Byron Bethany Road suggests that a high percentage of the vehicles that use this thoroughfare consists of large trucks. Mountain House Road is less heavily traveled and has an estimated ADT of 1,800 vehicles per day. Both Byron Bethany Road and Mountain House Road, like most other county roads in eastern Alameda County, were designated as scenic routes in Alameda County's 1966 Scenic Routes Element. However, because there are no residential areas in the immediate vicinity of this viewpoint, the two roadways appear to be heavily used for work-related trips, the traffic on both roadways travels at high speed, and little action appears to have been taken to capitalize on the scenic roadway status of the two roads (see discussion in Section 8.11.5), the sensitivity of this viewpoint is moderate.

The major elements in the existing view include the flat, open agricultural fields that occupy the foreground and middleground; the roadway and the wood pole transmission towers that parallel it to the east; the cluster of three large transmission towers; and elements of the Tracy substation that are visible on the right side of the road. The ridgeline formed by the

Coastal Range is visible in the view's background. Applying the Buhyoff landscape visual quality scale, the view from this area can be classified as having moderately low visual quality. Although the presence of the ridgeline in the background provides an element of visual interest, the view's foreground and middleground provide relatively little visual appeal, do not contain inviting features, and contain visually prominent infrastructure facilities.

KOP 2—Mountain House Road North of Kelso Road. Figure 8.11-4a represents the view from KOP 2, a viewpoint located along Mountain House Road at a point approximately 150 feet north of the intersection with Kelso Road. This viewpoint is approximately 0.3 mile south of the project site's southern boundary and 0.5 mile south of the proposed locations of the closest project structures. This viewpoint was selected to represent views toward the project site as experienced by northbound travelers on Mountain House Road. This viewpoint was located slightly north of the intersection of Mountain House and Kelso Roads rather than at the intersection of the two roads because vegetation around the farm complex in the northeast quadrant of the intersection blocks views toward the project site. Mountain House Road is not heavily traveled, and as indicated in Section 8.10.1.3, has an estimated ADT of 1,800 vehicles per day. Mountain House Road, like most other county roads in eastern Alameda County, was designated as a scenic route in Alameda County's 1966 Scenic Routes Element. This view is also representative of the views from the residences in the farm complex on the southwest corner of the 174-acre project parcel. Although these residences were occupied until recently, at the time the project is developed, all residential use of these structures will cease. Because this view is not a residential view, it is primarily experienced by the occupants of a small number of fast-moving vehicles, and little action appears to have been taken to capitalize on the scenic roadway status of this portion of Mountain House Road (see discussion in Section 8.11.5), the sensitivity of this viewpoint is moderate.

The primary element in the existing view is the open, flat agricultural field in the foreground and middleground. Other view elements include the roadway and the wood pole transmission towers that parallel it to the east, clusters of large transmission towers in the middleground, clusters of trees around farmsteads in the far middleground, and a glimpse of the surface of the Clifton Court Forebay in the background. Applying the Buhyoff landscape visual quality scale, the view from this area can be classified as moderately low. Although the distant glimpse of the surface of the Clifton Court Forebay provides a minor element of visual interest in the view's background, the view's foreground and middleground contain relatively few features of visual interest.

KOP 3—Mountain House Road at Mountain House School. Figure 8.11-5a represents the view from KOP 3, a viewpoint located along Mountain House Road in front of Mountain House School. This viewpoint is approximately 0.8 mile south of the project site's southern boundary and 0.95 mile south of the proposed locations of the closest project structures. This viewpoint was selected to represent views toward the project site from the area in front of the school and from the residence located to the school's immediate north. It also represents the views of northbound road travelers in this area and views from the road in front of the two additional residences located on the west side of Mountain House Road south of Kelso Road. Mountain House School is a public school with approximately 60 students in grades K through 8. Because of a thick row of evergreen trees planted along the north side of the school property, the project site is not visible from the school or from the school grounds. However, the project site is visible from the edge of the roadway in front of the school, and is thus visible to parents and students during school drop-off and pickup. Because views toward the northeast from the home adjacent to the school are relatively unobstructed, the project site is readily visible from this residence. The other two homes lying along the west side of Mountain House Road are surrounded by sufficient vegetation that screens views toward the project site to a large degree. However, the site would be readily visible to the residents of these homes as they check their mailboxes or drive out of their driveways. Because of the site's potential visibility from areas in the vicinity of residences and from the area along the roadway in front of the school, the sensitivity of this viewpoint is high.

The major elements in the existing view include the flat, open agricultural fields that occupy the foreground and middleground; the roadway and the wood pole electric distribution line that parallels it to the east; the tubular steel transmission tower along Kelso Road; more distant transmission towers, a cluster of trees at the southwest corner of the 174-acre project parcel, and in the background, a glimpse of the surface of the Clifton Court Forebay. Applying the Buhyoff landscape visual quality scale, the view from this area can be classified as having moderately low visual quality. Although the distant glimpse of the surface of the Clifton Court Forebay provides an minor element of visual interest in the view's background, the view's foreground and middleground contain relatively few features of visual interest.

KOP 4—Kelso Road. Figure 8.11-6a represents the view from KOP 4, a viewpoint located along Kelso Road in front of a residence located on the south side of the road, approximately half way between Mountain House and Byron Bethany roads. This viewpoint is approximately 0.55 mile southeast of the project site's southeastern corner, 0.65 mile southeast of the proposed location of the switching station, and 0.75 mile southeast of the closest generating facility structures. This viewpoint was selected to represent views toward the project site from the vicinity of the two residences located on the north side of the road in this area and from the farm complex located on the south side of the road that contains two or more residences. Because of the presence of vegetation, outbuildings, and other structures around the residences, the views seen from the residences and from the areas immediately surrounding them may not be as open as the view seen in Figure 8.11-6a. Because one of the residences in the complex on the south side of the road is sited behind the dwelling located along the road, it would not have a view toward the project site. The view visible in Figure 8.11-6a provides a general idea of what might be seen from the three residences and the areas around them, and a precise idea of the view visible from Kelso Road in this area. Because of the site's potential visibility from some of the residences and from the public roadway in front of them, this view has a moderate to moderately high level of sensitivity.

The major element in this view is the expanse of flat, open agricultural land that extends to the horizon. In addition, clusters of tall transmission towers and a portion of the berm along the Delta-Mendota Canal are visible in the middleground. Applying the Buhyoff landscape visual quality scale, the view from this area would be classified as having moderately low visual quality because of the absence of visually engaging features.

KOP 5—Byron Bethany Road at Lindeman Road. Figure 8.11-7a depicts the view from KOP 5, a view toward the project site taken from the intersection of Byron Bethany Road and Lindeman Road. This viewpoint lies approximately 0.75 mile from the site's eastern boundary, and 0.78 mile from the location of the project's closest structures. This KOP was selected to represent views toward the site experienced by northbound travelers on Byron Bethany Road, and by travelers turning from Lindeman Road onto Byron Bethany Road. Lindeman Road is considered to be an important viewpoint because it provides the primary means of access to and egress from Rivers End Marina and the cluster of approximately 30 residences in the Livermore Yacht Club area. It is important to note that this viewpoint is located in an open, agricultural landscape in which large infrastructure facilities are highly visible, and that it is a distinctly different environment from that which exists in the marina and residential area located in the sheltered pocket around the slough 0.6 mile to the north of this KOP.

This view does not fall within the cone of vision of motorists stopped at the stop sign at Lindeman Road's intersection with Byron Bethany Road. However, it can be glimpsed very briefly by drivers while they are in the process of making the turn from Lindeman Road into the northbound lane of Byron Bethany Road. For drivers of vehicles traveling north on Byron Bethany Road, this view is on the outer edge of their normal view cone. Byron Bethany Road is a major arterial, and as indicated in Section 8.10.1.3, has an ADT level of 13,820 vehicles per day. Observation of traffic on Byron Bethany Road suggests that a high percentage of the vehicles that use this thoroughfare consists of large trucks.

Byron Bethany Road, like many other county roads in eastern Alameda County, was designated as a scenic route in Alameda County's 1966 Scenic Route Element. This view has a moderate level of sensitivity. Although it is experienced by residents of the Livermore Yacht Club and users of the Rivers End Marina at the moment they turn north from Lindeman Road onto Byron Bethany Road, this is not the view they would see from the residential area and marina and is not the view that would be within their normal cone of vision as they drive south on Lindeman Road. Views from Byron Bethany Road are not highly sensitive because this highway appears to be heavily used for work-related trips, has high traffic speeds, and because little action appears to have been taken to capitalize on its scenic roadway status (see discussion in Section 8.11.5).

The major elements in the existing view include the Byron Bethany Road roadway, the flat, open agricultural fields that occupy the foreground and middleground, clusters of transmission lines in the middleground, and the ridgeline formed by the Coastal Range in the background. On days when the weather is clear, Mount Diablo's twin peaks can be seen rising above the ridgeline in the view's background. Applying the Buhyoff landscape visual quality scale, the view from this area can be classified as having a moderate to moderately high level of visual quality. Although the foreground and middleground of this view are undistinguished, the visual prominence of the Coastal Range ridgeline in the view and the visibility of Mount Diablo, an important regional landmark, give this view a higher level of visual quality than other views in the project area.

KOP 6—Transmission Corridor Viewed from Kelso Road. Figure 8.11-8a depicts the view from KOP 6, a viewpoint located along Kelso Road at a point 0.45 mile east of Mountain House Road and at the western edge of a farmstead located on the north side of the road. This viewpoint was selected to represent views toward the project's transmission corridors as seen from the adjacent property and from the westbound lane of Kelso Road. For this viewpoint, several standard photographs taken with a 50-mm lens were spliced together to create a wide angle view. This was done so that the view would encompass more of the area through which the project's preferred transmission line route will pass than would be the case with a single photo.

Because this viewpoint represents the view from a single home and from a lightly traveled road, the sensitivity of this view is moderately low.

The major elements in the existing view include the flat, open agricultural fields visible on both sides of the roadway, the roadway and the steel pole transmission towers and two sets of wood utility poles that parallel it, the row of trees in front of a portion of the Tracy substation, and the elements of the Tracy substation that have been left unscreened. The ridgeline formed by the Coastal Range is visible in the view's background. Applying the Buhyoff landscape visual quality scale, the view from this area can be classified as having moderately low visual quality. Although the presence of the ridgeline in the background provides an element of visual interest, the view's foreground and middleground provide a relatively low level of visual interest and contain visually prominent infrastructure facilities.

8.11.2 Environmental Consequences

8.11.2.1 Analysis Procedure

This analysis of the visual effects of changes that might be brought about by the EAEC project is based on field observations and review of the following information: local planning documents, project maps and drawings, photographs of the project area, computer-generated visual simulations from each of the KOPs, and research on design measures for integrating electric facilities into their environmental settings.

Site reconnaissance was conducted to view the site and surrounding area, to identify potential key observation points, and to take representative photographs of existing visual conditions. A single lens reflex (SLR) 35-mm camera with a 50-mm lens (view angle 40 degrees) was used to shoot site photographs.

Page-size photographs are presented to represent the "before" conditions from each KOP. Visual simulations were produced to illustrate the "after" visual conditions from each of these points, which provides the viewer with a clear image of the location, scale, and visual appearance of the proposed project. The computer-generated simulations are the result of an objective analytical and computer modeling process described briefly below. The images are accurate within the constraints of the available site and project data.

Computer modeling and rendering techniques were used to produce the simulated images of the views of the site as they would appear after development of the project. Existing topographic and site data provided the basis for developing an initial digital model. The project engineers provided site plans and digital data for the proposed generation facility, and site plans and elevations for the components of the transmission system. These were used to create three-dimensional (3-D) digital models of these facilities. These models were combined with the digital site model to produce a complete computer model of the generating facility and portions of the overhead transmission system.

For each viewpoint, viewer location was digitized from topographic maps and scaled aerial photos, using 5 feet as the assumed eye level. Computer "wire frame" perspective plots were then overlaid on the photographs of the views from the KOPs to verify scale and viewpoint location. Digital visual simulation images were produced as a next step based on computer renderings of the 3-D model combined with high-resolution digital versions of base photographs. The final "hardcopy" visual simulation images that appear in this AFC document were produced from the digital image files using a color printer.

8.11.2.2 Impact Evaluation Criteria

The analysis of the project's impacts was based on evaluation of the changes to the existing visual resources that would result from the project's construction and operation. An important aspect of this analysis was evaluation of the "after" views provided by the computer-generated visual simulations, and comparison of them to the existing visual environment. In making the determination of the extent and implications of the visual changes, consideration was given to:

- Specific changes in the affected visual environment's composition, character, and any specially valued qualities;
- Affected visual environment's context;
- Extent to which the affected environment contains places or features that have been designated in plans and policies for protection or special consideration; and
- Numbers of viewers, their activities, and the extent to which these activities are related to the aesthetic qualities affected by the likely changes.

To make the determination of whether the project's visual effects would be "significant" under the provisions of CEQA, reference was made to Appendix G of the State CEQA Guidelines. The CEQA Guidelines define a "significant effect" on the environment to mean a "substantial, or potentially substantial, adverse change in any of the physical conditions in the area affected by the project, including objects of historic or aesthetic significance" (14 CCR, § 15382.) Appendix G of the Guidelines, under Aesthetics, lists the following four questions for lead agencies to address:

1. Would the project have a substantial adverse effect on a scenic vista?
2. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?
3. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?
4. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

In addition, the CEQA Guidelines, under the Land Use and Planning section, pose the question as to whether the project would conflict with any applicable land use plan, policy, or regulation (including, but not limited to, a general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.

The CEC staff has determined that significant project visual impacts would result from [2]:

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[2] California Energy Commission, 1999. Final Staff Assessment for the Delta Energy Center, Application for Certification (98-AFC-3), Pittsburg, California, p. 184. The Commission itself has not adopted these criteria.

- Conflict with applicable implementing policies, ordinances, or other regulations for visual resources identified in the general plans or zoning ordinances of the local governments with jurisdiction over the project;
- Substantial reduction in the visual quality of views identified to be of moderate or high visual quality and high or moderately high viewer sensitivity[3]; or
- Creation of a new source of substantial light or glare in a location where it didn't exist before and which would adversely affect day or nighttime views with high or moderately high viewer sensitivity.

To respond to the ways that the CEC staff applies the CEQA significance standards, the criteria listed above were applied to assess the significance of this project's effects[4].

8.11.2.3 Project Appearance—Proposed Project

Generating Facility. The features of the proposed nominal 1,100-MW natural gas-fired combined-cycle generating facility are described in detail in Chapter 2.0, Project Description. Figure 2.2-1 is a plan that indicates the layout of the proposed project features on the site. Figure 2.2.2 provides typical elevation views. Table 8.11-2 summarizes the dimensions of the generating facility's major features.

An 8-foot non-reflective chain link fence, with an additional 2 feet of barbed or razor wire, will surround the generating facility, switching station, and ponds.

Landscaping. A landscape plan will be developed that will include planting of informal groupings of trees and shrubs along the boundaries of the project site to screen views from nearby areas. For views from more distant viewpoints, for which the landscaping will not completely screen the plant, the planting scheme will be designed to integrate the project facilities into the overall visual setting. The plan will emphasize the use of fast-growing evergreen species to ensure rapid achievement of year-round visual screening and view enhancement. It is assumed that the plan will emphasize planting very tall, fast-growing species along the northern, eastern, and southern perimeters of the project site to maximize the screening of the views from more distant viewpoints. Because the perimeter of the project site along Mountain House Road will be seen at close range, the planting along this side of the site will be somewhat different. It will include a combination of trees and shrubs to provide appropriate screening of the project from the road while avoiding conflicts with the clearance required by the wood pole transmission line that borders the western edge of the site. A variety of plant species will be selected and arranged to create positive visual interest for travelers on Mountain House Road.

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[3] It should be noted that this criterion sets a relatively low threshold for significance by considering effects on landscapes of "moderate" landscape quality. Presumably, this term refers to landscapes of average visual quality. It could be argued that landscapes of average visual quality do not fall within the class of landscape resources implied by the term "scenic vista" used in the CEQA guidelines.

[4] In applying the staff's criteria from prior cases in this analysis for informational purposes, the applicant does not imply agreement that these criteria necessarily reflect applicable law or standards for visual impacts under CEQA.

TABLE 8.11-2
Dimensions of the Major Generating Facility Features

Feature	Height (feet)	Length (feet)	Width (feet)	Diameter (feet)
HRSG Units				
HRSG casings	73	150	60	
To platform	78			
To top of highest drums	87			
To top of top works support steel	106			
To top of highest relief valves and vent silencers	108			
HRSG stacks	175			20
Gas Combustion Turbines				
Gas combustion turbines	26	107	30	
Gas turbine air inlet filters	65	60	45	--
Steam Turbine Generator				
STG enclosure	57	115	32	
STG pedestal	42	115	32	
Auxiliary Boiler				
Boiler	25	35	22	
Stack	100			4
Pipe Rack				
Rack	34 to 48	395 (Longest Section)	26	
Cooling Tower (19 cells)		1,030	54	34 (each cell)
To top of deck	43			
To top of cones	57			
Brine Concentrator	90	--	--	20
Tanks				
Raw Water Tanks	40	--	--	150
Demineralized Water Storage Tanks	40	--	--	52
Service Water Tank	34	--	--	36
Wastewater Tank	34	--	--	36
Administration/Maintenance Building	30	152	90	
Water Treatment Building	30	230	150	
Switchyard		300	256	
Switchyard Bus Structures	32			
Conductor Take-Off Structures	56			
Ponds				
Waste Storage Pond	--	530	340	
Stormwater Retention Pond	--	530	340	
Evaporation Ponds	--	1,150	260-760	

Lighting. The EAEC will require nighttime lighting for operational safety and security. To reduce any offsite impacts of this requirement, lighting at the facility will be restricted to areas required for safety, security, and operation. Exterior lights will be hooded, and lights will be directed onsite so that significant light or glare will not be created. Fixtures of a non-glare type will be specified. For areas where lighting is not required for normal operation, safety, or security, switched lighting circuits will be provided, thus allowing these areas to remain unilluminated at most times, minimizing the amount of lighting potentially visible offsite.

Water-Vapor Plumes. Under some circumstances, the project would produce visible steam exhaust plumes from the 19 cells of the cooling tower. The results of the computerized modeling of plume formation indicate that a plume of some length theoretically will be visible approximately 4,000 hours per year; however, only 1,250 of these hours will be during daylight. During nighttime hours, an observer could see the plume only if there were sufficient natural or artificial light. Because of the measures that will be taken to reduce lighting at the plant, any plumes that are created will not be highly visible during the nighttime hours.

Of the water-vapor plumes potentially visible during daylight hours, 40 percent will be less than 40 meters in length, 26 percent will be between 40 and 100 meters, 23 percent will be between 100 and 400 meters, and 11 percent will be more than 400 meters. It is important to note that the plumes will tend to form in the winter months and during early morning hours when the temperature is low and the humidity is relatively high. This is also the time when fog tends to form, and if fog is present, the plumes will tend to blend into the fog. The fog will not prevent the formation of visible water-vapor plumes; however, it will make it more difficult, if not impossible, for the plumes to be distinguished from the fog.

Under almost all circumstances, no visible plumes will be seen emanating from the plant's HRSG stacks. However, on a few occasions during the year when temperatures are low and humidity is high, water-vapor plumes coming from the stacks may be visible. The times when HRSG plumes are most likely to occur will tend to be at night and in the early morning hours when they are least likely to be visible.

Transmission System. The transmission intertie associated with the proposed project is described in Section 5.0. The preferred line route will link the EAEC switchyard to the existing MID/TID 230-kV line that runs along the south side of Kelso Road approximately 2,200 feet south of the switchyard. Figures 5.1-2 and 5.5-2 provide plan and elevation views that depict the preferred route alignment and transmission tower characteristics (typical tangent structure). Figure 5.2-5 illustrates the 90 degree angle dead-end structures that will be used along the MID/TID line at the point of the preferred route transmission loop. The angle and dead-end structures will be tubular steel transmission towers, typically 110 feet high (125 feet maximum) . The double-circuit transmission towers will be spaced up to approximately 800 feet apart between the EAEC switchyard and the MID/TID line. Conductor height at the tower locations will vary from 60 to 86 feet for the three circuits.

The new transmission structures will have a neutral gray finish that will be harmonious with the colors of the generating facility buildings and transmission structures, and help them fade into the backdrop.

Non-specular conductors will be used to reduce their visibility. Non-reflective and non-refractive insulators have also been specified. During construction, the appearance of the area along the right-of-way, which is located almost entirely on the Applicant project property, will be temporarily disrupted by the presence of construction equipment, pole sections, cables, and other disturbances associated with transmission line construction. However, because these effects will be minor and short in duration, they will not be the source of a significant visual impact.

Pipelines. The design features of the natural gas and water supply pipelines that would be built to serve the proposed project are described in Sections 6.0 and 7.0. The locations of these pipelines are indicated on Figure 2.1-1. Because these lines would be generally buried and the surface conditions restored, the lines themselves would not be the source of long-term changes to the visual environment. One of the water supply options would make use of a portion of an existing surface canal. Because this canal is already a part of the environmental setting and because no significant changes to its appearance would be entailed, its use would not be the source of aesthetic effects.

As a part of the gasline, there will be a gas metering station at the interconnection with the PG&E gas pipeline. The metering station will consist of several aboveground pipeline segments and valves and a small structure for controls. Because the structure will be small, the pipe segments will be low (extending no more than about 6 feet above the ground), and all major components can be painted neutral, earth-tone colors, the visual salience and potential for adverse visual impacts will be low. In the case of the preferred gas pipeline route and one of the alternatives, the metering station would be located on the site of the PG&E gas compressor station where it would be visually consistent with the facility's other features. The metering stations associated with the other gasline alternatives would be located along the portions of the PG&E pipeline adjacent to the Delta-Mendota Canal, which are somewhat removed from potential viewers and where the berm along the canal would provide backdropping for the stations' features.

The waterline will require a water pump station at its starting point at BBID Canal 45. This station will consist of several pumps mounted on a concrete pad. These pumps could extend up to 10 feet in height. Because the pump station equipment will be relatively small in scale and because it will be located on the canal side of the berm along the California Aqueduct, it will not be particularly noticeable, and it would not be the source of significant adverse visual impacts.

Any noticeable visual effects associated with the pipelines would be restricted to the construction phase. During construction, the area along the rights-of-way would be temporarily disrupted by machinery, excavated piles of dirt, construction vehicles, and other disturbances associated with pipeline construction. However, these effects would be minor and temporary, and would not be significant.

Construction. As detailed in Section 2.2.15, construction of the project from site preparation and grading to commercial operation is expected to take place during a 24-month period extending from second quarter 2002 to the second quarter of 2004. During the construction period, a 20-acre area north of the EAEC site will be used as a construction laydown area and for parking for construction workers.

8.11.2.4 Assessment of Visual Effects

KOP 1—Byron Bethany and Mountain House Roads. Figure 8.11-3b is the simulation that represents the view of the completed project as it would appear from KOP 1 10 years after completion of construction and installation of the perimeter landscaping.

As this simulation suggests, the plant will be clearly visible from Mountain House Road and Byron Bethany Road, and become a major element in the near middleground of the view. The project will change the existing view in that project structures will be inserted into the portion of the view behind the transmission towers and will partially obstruct views toward the distant ridgeline. The groupings of tall, fast-growing evergreen trees planted along the northern edge of the project site will screen the lower portions of the facility from view and will play a role in integrating the plant into the overall landscape composition. From this viewpoint, the tops of the HRSGs and the HRSG stacks will be seen against the sky, and will be prominently visible. In terms of their scale, the plant features will be bulkier than the existing elements in the view, but will appear no taller than the existing transmission poles and towers that will continue to be prominently visible in the portion of the view adjacent to the roadway.

The presence of the generating facility will change this view from one that is now a rural scene with prominently visible electric transmission and substation structures to a scene that is less rural and that appears more intensively developed. Although the character of this scene will change somewhat, the overall quality of the view will not be significantly altered. As indicated in Section 8.11.1.4, this view can now be classified as moderately low on the visual quality scale. Given that the plant will have an orderly appearance and will be surrounded by significant tree plantings that screen the generating facility's lower features, will visually integrate it into the overall landscape composition, and will provide a new element of visual interest, the visual quality rating of the view would not necessarily be decreased once the plant is in place.

KOP 2—Mountain House Road North of Kelso Road. Figure 8.11-4b is the simulation that represents the view of the project as it would appear from KOP 2 along Mountain House Road just north of the intersection with Kelso Road at 10 years after completion of the plant's construction and installation of the landscaping.

As this simulation indicates, the plant will be clearly visible from Mountain House Road and will become the major element in the near-middleground of the view. The project will change the existing view in that what is now an open view toward the horizon will become a view that is terminated in the near-middleground by the generating facility's built forms. The tall, fast-growing evergreen trees planted along the southern edge of the project site will screen the generating facility's lower elements from view and will help to create a pleasing landscape composition. The generating facility's features will clearly be bulkier than the transmission structures now visible in the view, but will appear no taller than the transmission poles adjacent to the roadway. The tops of the HRSG structures, the HRSG stacks, and the brine concentrator will be visible against the sky, which will tend to increase their visual salience. In views toward the project from portions of the roadway that are closer to or adjacent to the plant site, the project will be screened by hedges and trees planted in the immediate foreground of the view. In these areas, what is now an entirely open view will be replaced by a view that is enclosed to some degree. The landscape planting scheme proposed for this area will be designed to create a high level of foreground visual interest that will compensate for the loss of the more distant views.

The development of the project will change this view from one that is now a rural scene in which transmission poles and towers are prominently visible to a scene that is less open, less rural and more developed in character. Although the character of this scene will be changed to a large degree, the overall quality of the view will not be decreased. At present, the view visible from this KOP can be classified as moderately low on the visual quality scale. The presence of the proposed generating facility in this view will not appreciably alter the view's visual quality rating. The project facilities will have an orderly appearance and will be surrounded by significant tree plantings that screen the project's lower elements. The landscaping will visually integrate the project into the overall landscape composition, and provide a new element of visual interest.

KOP 3—Mountain House Road at Mountain House School. Figure 8.11-5b is a simulated view of the project as it would appear from KOP 3 along Mountain House Road in the area in front of Mountain House School at the time 10 years after plant construction and installation of the project landscaping.

As this simulation indicates, the plant's stacks and HRSG units, and to a lesser degree the cooling tower, will be clearly visible from Mountain House Road and will become an important element in the middleground of the view. The towers associated with the project's transmission line will also become a new, but relatively minor, element in the view. The project will change the existing view in that what is now a partially open view toward the horizon will become a view that is terminated to a somewhat larger degree in the middleground by the generating facility's built forms and perimeter tree line. The tall, fast-growing evergreen trees planted along the southern edge of the project site will screen the generating facility's lower elements from view and will help to integrate the project into the overall landscape setting. The generating facility's features will be larger and bulkier than the transmission structures now visible in the view, but will appear no taller than the utility poles adjacent to the roadway in the area near the school. The tops of the HRSG structures, the HRSG stacks and, to a lesser degree, the brine concentrator will be visible against the sky, which will tend to increase their visual salience, but the use of neutral gray colors for these features will help to reduce their contrast with the sky backdrop.

The development of the project will change this view from one that is now a rural scene in which utility poles and towers, farm structures, and perimeter tree lines are prominently visible to a scene that is somewhat less open and more developed in character. Although the character of this scene will be changed to a large degree, the overall quality of the view will not be decreased. At present, the view visible from this KOP can be classified as moderately low on the visual quality scale. The presence of the proposed generating facility in this view will not appreciably alter the view's visual quality rating. The project facilities will have an orderly appearance and will be surrounded by significant tree plantings that screen the project's lower elements. The landscaping will visually integrate the project into the overall landscape composition, and provide a new element of visual interest.

KOP 4—Kelso Road. Figure 8.11-6b is a simulated view of the project as it would appear from KOP 4 along Kelso Road, 0.75 mile southeast of the closest plant structures. The simulation depicts the project as it would appear 10 years after construction of the generating facility and installation of the landscaping.

As can be seen in the simulation, the plant will be clearly visible from the area along Kelso Road and will become the major element in the middleground of the view. The project will change the existing view in that what is now a wide open view toward the horizon will become a view that is partially occupied in the near-middleground by the generating facility's stacks, HRSG structures, and perimeter landscaping. The tall, fast-growing evergreen trees planted along the eastern and southern edges of the project site will screen the generating facility's lower elements from view and will help to create a pleasing landscape composition. The tops of the HRSG structures, the HRSG stacks, and the brine concentrator will be visible against the sky, which will tend to increase their visual salience, but the use of neutral gray colors will decrease their contrast with the sky backdrop.

The development of the project will change this view from one that is now a wide open rural scene in which transmission structures and conductors are prominently visible, to a scene that is less open, appears somewhat more developed, and has considerably more trees. Although the character of this scene will be changed to some degree, the overall quality of the view will not be decreased. At present, the view visible from this KOP can be classified as moderately low on the visual quality scale. The presence of the proposed generating facility in this view will not appreciably alter the view's visual quality rating. The project facilities will have an orderly appearance and will be surrounded by significant tree plantings that screen the project's lower elements. Besides providing substantial screening, the landscaping will create a new element of visual interest.

KOP 5—Byron Bethany Road at Lindeman Road. Figure 8.11-7b is the simulation that represents the view toward the generating facility from KOP 5, a point along Byron Bethany Road at its intersection with Lindeman Road. As this simulation indicates, from this view, the HRSG units, HRSG stacks, gas turbine air inlet filters, cooling tower, and brine concentrator would all be prominently visible. The tree plantings around the project site's perimeter would screen the lower portions of these project elements, and would substantially hide the project's lower elements from view. In spite of the project's 0.75-mile distance from this viewpoint, the HRSGs and HRSG stacks would appear as relatively large features in the view. The project's taller elements will, for the most part, be seen up against a hill backdrop rather than a sky backdrop, which will to some extent reduce their level of contrast and thus visibility. In this view, the project's visual salience is increased somewhat by its location against the backdrop of Mount Diablo. Because Mount Diablo is an important regional landmark, it is fair to say that it tends to attract the public's attention, and that anything visible in the same line of site is likely to be more heavily noticed than it might be otherwise.

Although this view contains an important landmark, as noted in the description of existing conditions for this KOP, the sensitivity of this view is moderate at most because it lies on the outer edge of the cone of vision of fast-moving drivers along Byron Bethany Road and is seen very briefly by drivers on Lindeman Road at the moment they turn north onto Byron Bethany Road.

The development of the project will change the composition of this view. At present, the view is one that has a strongly horizontal composition, and that is dominated by large, flat open fields with a scattering of large transmission towers in the middleground and visually prominent ridgelines and peaks in the background. With the development of the project, the generating facility's HRSGs and HRSG stacks will add prominently visible vertical elements which will contrast with the horizontality of the existing scene. Although they will appear no taller than many of the existing transmission towers, the HRSG units will appear to be considerably more bulky.

At present, the view visible from this KOP can be classified as moderate to moderately high on the visual quality scale. Because of the generating facility's visual prominence in the line of sight toward Mount Diablo and because of the visual contrast with the setting created by the verticality of the plant's taller elements, the presence of the proposed generating facility in this view has the potential to lower the scene's visual quality to moderate.

KOP 6—Transmission Corridor Viewed From Kelso Road. Figure 8.11-8b is a simulation of the view from KOP 6 as it would appear after construction of the transmission lines that will be developed to link the project to the existing 230-kV line located along the south side of Kelso Road. As the two new transmission towers visible in the right center of the simulation suggest, the transmission link would consist of two parallel double-circuit 230-kV lines carried on tubular steel poles. These two lines would run north-south through the center of the field that constitutes the southern end of the 174-acre parcel. As can be seen at the left side of the simulation, these two new lines would connect to the existing 230-kV line along the south side of Kelso Road where four new tubular poles would serve as angle structures.

The view toward the northwest across the open field would not be substantially changed by the presence of the new transmission poles. These poles are similar in form to the substation structures visible behind them, and will tend to be visually absorbed by the substation backdrop. The four new tubular angle structures to be located along the south side of Kelso Road will be more visible. Due to lateral stresses, these structures have a larger diameter than the existing transmission towers and because of their greater diameter, and because there are four of them, they will become a noticeable new feature in the area along the south side of the road.

Although the project's transmission structures will be visible in this view, they will have little effect on its composition and character because they will be similar in appearance and scale to the other transmission line and substation equipment that are already important elements of the scene. At present, the view visible from this KOP 6 can be classified as moderately low on the visual quality scale. Because the project's transmission facilities are so similar to what is already in the scene, they will have no discernable effect on its overall visual quality.

Water Vapor Plumes. Under some circumstances, the project would produce visible steam exhaust plumes from the 19 cells of the cooling tower. The results of the computerized modeling of plume formation indicate that a plume of some length will be theoretically visible approximately xxx hours per year; however, only yyy of these hours will be during daylight. During nighttime hours, an observer could see the plume only if there were sufficient natural or artificial light. Because of the measures that will be taken to reduce lighting at the plant, any plumes that are created will not be highly visible during the nighttime hours.

Of the water-vapor plumes potentially visible during daylight hours, aa percent will be less than 40 meters in length, bb percent will be between 40 and 100 meters, cc percent will be between 100 and 400 meters, and dd percent will be more than 400 meters. It is important to note that the plumes will tend to form in the winter months and during early morning hours when the temperature is low and the humidity is relatively high. This is also the time when fog tends to form, and if fog is present, the plumes will tend to blend into the fog. The fog will not prevent the formation of visible water-vapor plumes; however, it will make it more difficult, if not impossible, for the plumes to be distinguished from the fog.

Under almost all circumstances, no visible plumes will be seen emanating from the plant's HRSG stacks. However, on a few occasions during the year when temperatures are low and humidity is high, water-vapor plumes coming from the stacks may be visible. The times when HRSG plumes are most likely to occur will tend to be at night and in the early morning hours when they are least likely to be visible.

Light and Glare. The EAEC's effects on visual conditions during hours of darkness will be very limited. As indicated in Section 8.11.2.3, some night lighting will be required for operational safety and security. High illumination areas not occupied on a regular basis will be provided with switches or motion detectors to light these areas only when occupied. At times when lights are turned on, the lighting will not be highly visible offsite and will not produce offsite glare effects. The offsite visibility and potential glare of the lighting will be restricted by specification of non-glare fixtures, and placement of lights to direct illumination into only those areas where it is needed. The landscape screening to be installed around the site will further reduce the visibility of facility's night lighting, particularly in views from areas located close by.

Construction Period Impacts. The 20-acre construction laydown area will be located north of the project site. The parked vehicles, equipment, and stored materials in this area will be most visible in views from nearby segments of Mountain House Road and Byron Bethany Road, which are best represented by KOP 1. Although the vehicles, equipment, and stored materials in the laydown area will be readily visible in these views and will change their character to some degree, they will not substantially reduce their visual quality, which is now moderately low. The vehicles, equipment, and materials in the laydown area will be considerably less visible in views from the other KOPs because of the greater distances involved, and because once the plant structures start being put into place, they will have the effect of screening the laydown area in views from these angles. After development of the generating facility's structures is completed, the laydown area will be returned to its present condition.

8.11.3 Impact Significance

To assess whether the project would have significant impacts on the project area's visual resources, the project's effects were evaluated by applying the set of criteria that CEC staff have developed to implement CEQA's significance guidelines. The evaluation based on these criteria indicates that the project would not have a significant adverse visual impact.

CEC staff's criteria for implementing CEQA's significance guidelines, and the relationship of the project's effects to them are summarized below.

(1) Conflict with applicable implementing policies, ordinances, or other regulations for visual resources identified in the general plans or zoning ordinances of the local governments with jurisdiction over the project.

As documented in the LORS analysis in Section 8.11.5, the project will be in conformance with the applicable implementing policies, ordinances, or other regulations specifically related to visual resources identified in the Alameda County plans and zoning ordinance provisions that pertain to this area.

(2) Substantial reduction in the visual quality of views identified to be of moderate or high visual quality and high or moderately high viewer sensitivity.

Because no areas in the project viewshed have both a moderate to high level of visual quality and a moderately high to high level of viewer sensitivity, there are no areas where the visibility of project construction activities, the completed generating facility or transmission line, or any water vapor plumes the project might create would have the potential to create significant visual impacts as defined by CEC staff's criteria for applying the CEQA guidelines.

(3) Creation of a new source of substantial light or glare in a location where it didn't exist before and which would adversely affect day or nighttime views with high or moderately high viewer sensitivity.

As described in Section 8.11.2.3, project light fixtures will be restricted to areas required for safety, security, and operations; lighting will be directed onsite; lighting will be shielded from public view; and non-glare fixtures and use of switches, sensors, and timers to minimize the time that lights not needed for safety and security are on will be specified. These measures should substantially reduce the offsite visibility of project lighting. Offsite visibility of lighting will be further reduced by the landscape plantings that will provide additional screening of any lighting associated with the project's lower elements. With these measures, lighting associated with the project will not pose a hazard or adversely affect day or nighttime views toward the site.

8.11.4 Cumulative Impacts

At present, the only project of any significance planned in the area around the project site is the Mountain House new community described in Section 8.11.1.1. The first phase of this project has been approved and construction is to begin in spring 2001. If this project proceeds as planned, over the next 20 to 40 years, it would transform the 1.5-mile-wide corridor on the east side of the San Joaquin County line, extending from Interstate 205 north to the Old River, into a suburban community containing a mix of housing, offices, and commercial and industrial uses. The initial phases of this project will be located 3 miles southeast of the project site. The portions of the planned Mountain House community that are closest to the project site are those that are north of Byron Bethany Road and 0.85 mile to the east of the project site. These areas are not planned for development in the near term, so it is unclear how soon they might be developed.

No major projects are known to be in the planning stages at present for the area in the immediate vicinity of the EAEC site. As a consequence, the area around the site can be expected to maintain its current appearance for some time. Given this context, there will be no other developments in the immediate vicinity of the EAEC site that would have effects that the EAEC would combine with to create cumulative visual resource impacts.

8.11.5 Laws, Ordinances, Regulations, and Standards

8.11.5.1 Introduction

This section describes the LORS relevant to the visual resource issues associated with the EAEC project (see Table 8.11-3). No federal, state, or regional laws, ordinances, regulations, or standards are known that would apply to the project's visual resource issues. However, visual resource and urban design concerns germane to the project are addressed in Alameda County's East County Area Plan, the Alameda County Scenic Routes Element, and the Alameda County Zoning Ordinance.

As indicated in the Land Use analysis (Section 8.4), the generating facility site, the two alternative transmission line alignments, and the gasline alternatives are all located in unincorporated areas of Alameda County, and are thus subject to Alameda County planning and zoning requirements. The waterline alternatives include portions located in both Alameda and Contra Costa counties and the recycled water alternatives have segments located in Alameda and San Joaquin counties. Because the development of the project's waterline will not entail changes that will result in substantial long-term changes to the appearance of the environment, this analysis will be restricted to a review of the Alameda County plans and ordinances that have potential relevance to the visual resource issues associated with the project's other elements.

TABLE 8.11-3
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Visual Resources

Document	Applicability	AFC Section	Agency/Contact
Alameda County East County Area Plan	Describes policies defining and for preserving sensitive viewsheds in eastern Alameda County.	Section 8.11.5.2	Alameda County Planning Department Chris Bazar Assistant Planning Director 224 West Winton Ave, Room 224 Hayward, CA 94544 510/670-5400
Alameda County Scenic Route Element of the General Plan	Designates scenic routes and establishes principles for the management of visual changes in the corridors along them.	Section 8.11.5.3	Same as above
Alameda County Zoning Ordinance	Establishes classes of zoning districts governing the use of land and placement of buildings and improvements. Includes design review guidelines.	Section 8.11.5.4	Same as above

8.11.5.2 East County Area Plan

The East County Area Plan adopted in 1994 includes a number of provisions that are potentially relevant to the development of the EAEC.

Policy 111. Policy 111 indicates that the County is to require development to maximize views of a number of specified "prominent visual features." The only features listed that are visible from the project area are Mount Diablo and Brushy Peak. For each of these features, there will be a short segment along Byron Bethany Road where the project and these distant landmarks will be in alignment. In views toward the west from these areas, the project facilities will be seen in front of the landmark feature, and at the point at which there is perfect alignment, the view of the landmark may be partially blocked. This effect does not create a conflict with this policy in that the blockage effects are restricted to one specific location along the highway for each of the two landmarks, and for drivers and passengers in vehicles traveling along the highway at high rates of speed, the blockage effect will last for just a few seconds.

Policy 113. Policy 113 calls on the County to require "the use of landscaping in both rural and urban areas to enhance the scenic quality of the area and to screen undesirable views. Choice of plants should be based on compatibility with surrounding vegetation, drought-tolerance, and suitability to site conditions; and in rural areas, habitat value and fire retardance." The project will be consistent with this policy in that the project will include landscaping around the periphery of the site that will be designed to screen views of project facilities and to create visual interest. In developing its final landscape plan, the Applicant would work with the County to ensure that the plant selections and planting designs meet the County's goals for habitat enhancement, drought tolerance, compatibility with surrounding vegetation, and fire retardance.

Policy 117 and Policy 264. Policy 117 indicates that "The County shall require that utility lines be placed underground whenever feasible. When located above ground, utility lines and supporting structures shall be sited to minimize their visual impact." Policy 264 states "The County shall require new developments to locate utility lines underground, whenever feasible." The 230-kV lines serving the project will be built overhead rather than underground. This is standard practice for lines of this voltage located in rural and lower density areas Because the project's transmission link will be short in length (0.5 mile in total) and will be built in an area where transmission lines are already a well-established part of the landscape, it will have little effect on the setting's overall visual character and quality. The costs of undergrounding high voltage transmission lines like the 230 kV line required to serve the project are very high. Because of the requirements for expensive transition stations at each end of an underground line and for provisions for insulating and cooling the underground conductors, building high voltage lines underground generally costs about 7 times the cost of building them overhead. Given the very marginal aesthetic benefit that undergrounding the project transmission line would produce, it was determined that it would not be economically feasible or prudent to build the line underground. Instead, the emphasis was placed on minimizing the line's aesthetic effects by making use of the existing transmission corridor along Kelso Road, locating the section of entirely new line well east of Mountain House Road, and for the limited number of new transmission towers that will be required, specifying tubular steel towers with a dull, gray finish.

Policy 197. Policy 197 calls on the County to "manage development and conservation of land in East County scenic highway corridors to maintain and enhance scenic values." As an implementation measure related to this policy, the plan suggests that "The County shall update the Scenic Route Element of the General Plan to include a revised list of scenic corridors in East County." To date, the updating of the Scenic Route Element called for in the plan has not taken place (Bazar, 2000). Two of the roads near the project site, Byron Bethany Road and Mountain House Road, are designated scenic routes. As discussed in Section 8.11.5.3, development of the EAEC as planned on the project site will not be inconsistent with the County's scenic route policies.

8.11.5.3 Scenic Route Element of the Alameda County General Plan

In 1966, Alameda County adopted a Scenic Route Element as a part of the County's General Plan. The stated principles of the plan are discussed in the following sections.

Provide a Continuous, Convenient System of Scenic Routes. A system of scenic routes should be complete enough to be convenient to all persons in Alameda County and provide continuous pleasurable driving in major scenic areas and between major scenic areas and recreational and cultural centers in Alameda County and adjacent areas. The routes should afford aesthetically pleasing views to both the traveler and the outside observer throughout the entire system.

Establish Efficient and Attractive Connecting Links. The scenic route system should include attractive and efficient links between routes of major scenic value and recreational and cultural centers. These links should include certain freeways and other roadways, coordinated among appropriate jurisdictions.

Provide for Unimpeded Pleasure Driving. Relatively uninterrupted movement of pleasure driving vehicles on scenic routes should be accommodated through control of access, through avoidance of stop signs, and through synchronization of traffic signals whenever possible on scenic expressways and thoroughfares. Through-movement of trucking should be prohibited on scenic routes unless no generally paralleling through-routes are provided within a reasonable distance.

Coordinate Scenic Routes and Recreation Areas. Maximum coordination of scenic routes and adjacent public recreation areas such as parks, scenic outlooks, roadside rests, and cycling, hiking, and riding trails should be planned. Recreation routes and trails should continue into adjacent counties to provide continuous networks for the enjoyment of the public. Scenic route recreation trails should be coordinated with existing and planned local, regional, and state trails.

Guide and Control Preservation and Development of Scenic Routes through Legislative Standards. As a means of implementing city and county general plans and protecting and enhancing scenic values, city and county legislation that includes standards should be established to coordinate, guide, and control preservation and development of scenic routes, scenic corridors, and areas beyond the scenic corridor.

The Scenic Route Element was adopted just one year after the seminal White House Conference on National Beauty, at a time when scenic highway planning and visual resource analysis and management were in their very earliest stages. Since that time, the only change made to the element is that in 1994, it was amended to delete the standards for the design of scenic roadways that were a part of the original plan. In its present form, the plan reflects the ambitiousness and lack of specificity of the earliest efforts to grapple with scenic roadway and visual resource issues. The plan designates nearly all major county roads in the rural east county as scenic routes and proposes a sweeping set of policies for the design of the roads and their rights-of-way and for the management of the appearance of the development occurring along them. In practice, at least in the rural east county, the plan appears to have had a relatively modest impact. No formal scenic roadways have been developed in the east county, and the plan has not prevented the installation of thousands of wind turbines in areas in the immediate viewsheds of Interstate 580, Altamont Pass Road, Vasco Road, Mountain House Road, and other designated scenic routes in the Altamont Pass Wind Resource Area. Along Mountain House Road across from the project parcel, the 500-kV addition to the Tracy substation was developed in the area immediately adjacent to the roadway and no landscaping or screening of any kind was installed.

In the project area, the element designates both Mountain House Road and Byron Bethany Road as scenic rural roads. In rural areas, the scenic corridor within which the element's policies apply is defined as 1,000 feet. The portion of the 174-acre parcel on which the EAEC will be developed lies over 1,000 feet from Byron Bethany Road, but a part of the construction laydown area will fall within the outer edge of this 1,000-foot zone. Because the construction period will be limited in duration and because the appearance of the laydown area will be restored to its existing condition when construction is complete, the presence of the laydown area within the 1,000-foot zone is not likely to be the source of a conflict with the Scenic Route policies. The Scenic Route Element policies are most applicable to the portion of the project site that lies along Mountain House Road. Specific Scenic Route Element policies that may be relevant to the area within 1,000 feet of Mountain House Road include:

> **Provide for Normal Uses of Land and Protect against Unsightly Features**. In both urban and rural areas, normally permitted uses of land should be allowed in scenic corridors, except that panoramic views and vistas should be preserved and enhanced through supplementing normal zoning regulations with special (see Scenic Route Corridor Development Standards, page 18)[5] height, area, and sideward regulations; through providing architectural and site design review; through prohibition and removal of billboards, signs not relevant to the main use of the property, obtrusive signs, automobile wrecking and junk yards, and similar unsightly development or use of land. Design and location of all signs should be regulated to prevent conglomerations of unsightly signs along roadsides.
>
> **Locate Transmission Towers and Lines Outside of Scenic Route Corridors when Feasible**. New overhead transmission towers and lines should not be located within scenic corridors when it is feasible to locate them elsewhere.
>
> **Establish Architectural and Site Design Review**. Architectural and site design review by the appropriate local jurisdiction should be provided for each site and for all new or altered structures so that particular consideration will be given to appearances that will enhance scenic qualities from the scenic routes. Originality in landscape and construction design should be encouraged. Such designs should be in keeping with cityscape and natural skyline and reflect the density, movement, and activities of the population.
>
> **Use Landscaping to Increase Scenic Qualities of Scenic Route Corridors**. Landscaping should be designed and maintained in scenic route corridors to provide added visual interest, to frame scenic views, and to screen unsightly views.

Policies of the element that apply to both the scenic route corridor and the remainder of the County that may be applicable to the project include:

> **Landscape all Properties and Streets**. All new building sites, including parking areas and vehicular entrances in business, commercial and industrial areas should be landscaped, and street trees should be planted along all rights-of-way in the county as a means of improving the scenic quality of the county.

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[5] None of the Scenic Route Corridor Development Standards presented on page 18 of the element would be applicable to the project in that it is a non-residential project located on a flat site in an area where the view seen is not an "outstanding scenic view."

Encourage Owners of Large Holdings to Protect and Enhance Areas of Scenic Values. Public agencies and private individuals having control of large holdings should be encouraged to protect and enhance natural resources within their properties. Cooperation should also be sought with owners of smaller lots and with community improvement and conservation groups.

Even though the EAEC will be located within the 1,000-foot scenic corridor along Mountain House Road, the project will not be inconsistent with the policies presented in the Scenic Route Element. The site itself does not have outstanding scenic features that require protection. As indicated in the analyses of the views from KOPs 1 and 2, the views across the site from Mountain House Road do not provide visual access to outstanding scenic views. In the development of the design for the project, the major pieces of equipment have been laid out in a neat and orderly way, and a landscaping strategy has been developed that will screen views of the plant to the extent feasible. The presence of an existing transmission line along the east side of Mountain House Road precludes the planting of street trees in the EAEC's frontage along the road, but this roadside will be landscaped with a combination of a shrubbery hedge with trees behind that will create an attractive appearance for the portion of the project site adjacent to the road. Signage related to the EAEC will be limited, and any signs not required by safety regulations will be discreet in size and design. Although the transmission lines associated with the project are located within the 1,000-foot corridor along Mountain House Road, the lines will be set back a minimum of 600 feet from the road, and will entail the use of a small number of tubular steel towers.

8.11.5.4 Alameda County Zoning Ordinance

Under the Alameda County Zoning Ordinance, the project site is designated as falling into the Large Parcel Agriculture Zone. In this zone, there is no limit on the height of structures, the minimum depth for front yards is 30 feet, the minimum depth for rear yards is 10 feet, and the minimum width for side yards is 10 feet. While the project will not conflict with any of these design requirements, the project expects to work closely with both the County and CEC staff to design the project to be consistent with the existing conditions, and to design project heights, colors, and towers so as not to detract from the visual quality of the area

8.11.5.5 Summary

The project is consistent with all applicable laws, ordinances, regulations, and standards related to visual resource issues.

8.11.6 Mitigation Measures

8.11.6.1 Generating Facility

The following mitigation measures have been included in the project design to reduce the generating facility's impacts on visual resources:

Careful site planning and landscape design, including the following:

- Creation of a 50-foot setback area between the edge of Mountain House Road and the project fence to provide spatial separation between the project and the road and to provide ample space for installation of landscaping. The landscape treatment along

Mountain House Road will likely consist of formal plantings of a variety of shrub species to create a hedge along the edge of the road, backed up by plantings of informal groupings of tall evergreen trees to provide screening of the plant's taller elements.

- Placement of the water tanks, administration building, and other smaller structures on the western edge of the site to create a transition in scale between the corridor along Mountain House Road and the plant's taller features.
- Placement of landscaping consisting of informal groupings of fast-growing evergreen trees along the northern, eastern, and southern edges of the site to screen the lower portions of the project's facilities and to visually integrate the facility into the landscape.

Thoughtful design of the generating facility structures, and use of a palette of neutral colors for structure surfaces intended to create a visually interesting composition that blends with its backdrop and reduces the apparent mass of the complex.

Additional measures will include the following:

- Color treatment of fences to blend with the surrounding environment.
- Minimal signage and construction of project signs using non-glare materials and unobtrusive colors. The design of any signs required by safety regulations will need to conform to the criteria established by those regulations
- Minimization of lighting to areas required for safety, security, or operations, and shielding of lighting from public view to the extent possible. Timers and sensors will be used to minimize the time that lights are on in areas where lighting is not normally needed for safety, security, or operation.
- Direction and shielding of lighting to reduce light scatter and glare. Highly directional light fixtures will be used.

Additional mitigation measures to reduce or eliminate generating facility impacts identified in this analysis may include the following:

- At present, the Applicant is proposing to use a palette of neutral gray tones for the project structures because these colors have been proven effective in reducing the contrast of large infrastructure facilities with sky and many landscape backdrops. These are the colors that are reflected in the visual simulations that have been prepared. If Alameda County and the CEC feel a need to evaluate color issues further, additional color studies can be conducted to refine the color scheme to maximize the visual integration of project facilities into their landscape backdrop.
- Design and installation of temporary cyclone fencing around the laydown area adjacent to the plant to reduce the visibility of construction period activities.

8.11.6.2 Transmission Line

The following mitigation measures for the transmission line have been included in the project design:

- The transmission line structures used will be tubular steel with a neutral gray finish.

- Non-specular conductors will be used.
- Insulators will be non-reflective and non-refractive.

8.11.6.3 Pipelines

The following mitigation measures have been included as a part of the project proposal to reduce the visual impacts of the proposed pipelines:

- After construction, ground surfaces will be restored to their original condition, and any vegetation that had been removed during the construction process will be replaced.
- Equipment in the gas metering and raw water pump stations will be painted earth-tone colors selected to maximize their visual integration into their backdrops.

8.11.7 References

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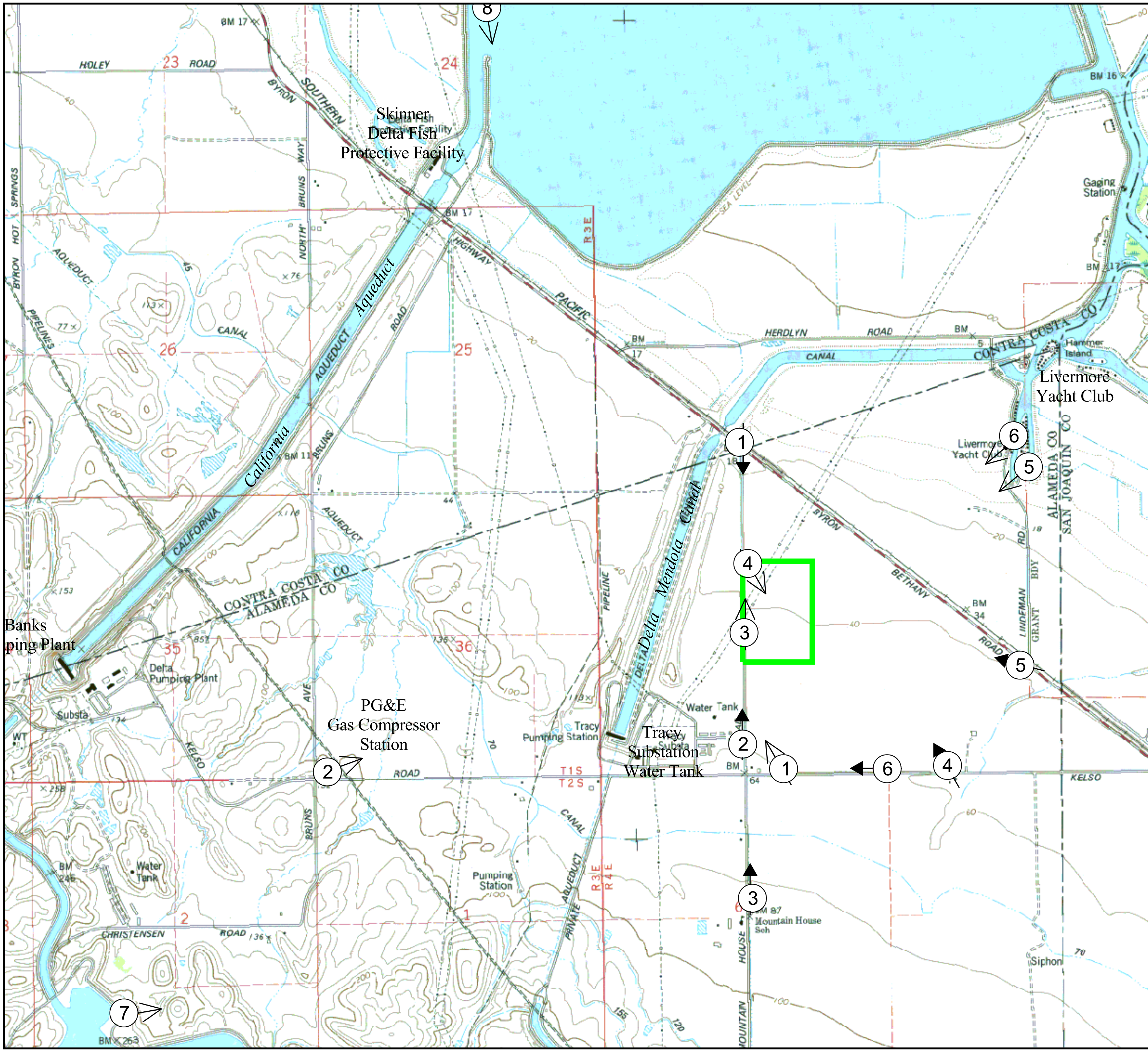

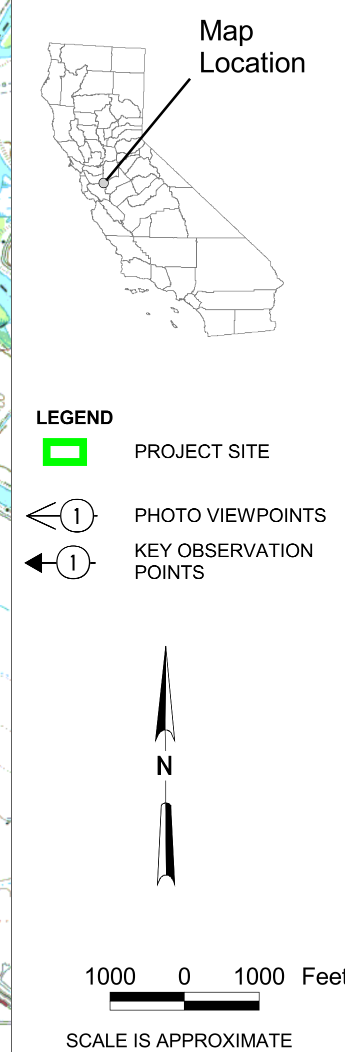

FIGURE 8.11-1
LOCATION OF THE VIEWPOINTS,VIEWSHEDS, AND KEY OBERSVATION POINTS

APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

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1. VIEW OF 500 KV PORTION OF TRACY SUBSTATION AS SEEN FROM KELSO ROAD. THE LEVEE ALONG THE DELTA-MENDOTA CANAL IS VISIBLE TO THE RIGHT.

2. VIEW OF THE PG&E GAS COMPRESSOR STATION AS SEEN FROM KELSO ROAD. THE TRACY PUMPING PLANT AND SUBSTATION ARE VISIBLE IN THE RIGHT MIDDLE GROUND.

3. VIEW OF SITE FROM MOUNTAIN HOUSE ROAD, LOOKING NORTH TOWARD THE NORTHWEST CORNER.

4. VIEW LOOKING SOUTHEAST ACROSS PROJECT SITE FROM THE SITE'S NORTHWEST CORNER.

FIGURE 8.11-2a
VISUAL CHARACTER PHOTOS
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

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3250_01 (3/26/01)

5. VIEW FROM PARKING LOT AND BOAT RAMP AREA BY THE LIVERMORE YACHT CLUB TOWARD THE PROJECT SITE. VIEW TOWARD SITE IS SCREENED TO A LARGE DEGREE BY INTERVENING LAND SCAPE ELEMENTS.

6. VIEW TOWARD THE PROJECT SITE FROM THE LEVEE ROAD ALONG THE WEST SIDE OF THE LIVERMORE YACHT CLUB AREA.

7. VIEW TOWARD THE PROJECT SITE FROM THE TRAIL ALONG THE BETHANY RESERVOIR. THE PROJECT SITE IS LOCATED IN THE BACKGROUND TO THE LEFT OF THE VIEW'S CENTER

8. WINTER VIEW TOWARD PROJECT SITE(IN FAR DISTANCE) FROM INFORMAL FISHING AREA AT THE HEAD OF THE CALIFORNIA AQUEDUCT AT CLIFTON COURT FOREBAY.

FIGURE 8.11-2b
VISUAL CHARACTER PHOTOS
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER
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3250_02 (3/26/01)

FIGURE 8.11-3a
EXISTING VIEW FROM KOP1
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

3271_03a (02/08/01)

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FIGURE 8.11-3b
VISUAL SIMULATION OF PROJECT FROM KOP1 AT 10 YEARS
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

3271_03b (02/08/01)

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FIGURE 8.11-4a
EXISTING VIEW FROM KOP2
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

3271_04a (02/08/01)

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FIGURE 8.11-4b
VISUAL SIMULATION OF PROJECT FROM KOP2 AT 10 YEARS
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

3271_04b (02/08/01)

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FIGURE 8.11-5a
EXISTING VIEW FROM KOP3
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

3271_05a (02/08/01)

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FIGURE 8.11-5b
VISUAL SIMULATION OF PROJECT FROM KOP3 AT 10 YEARS
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

3271_05b (02/08/01)

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FIGURE 8.11-6a
EXISTING VIEW FROM KOP4
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

3271_06a (02/08/01)

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FIGURE 8.11-6b
VISUAL SIMULATION OF PROJECT FROM KOP4 AT 10 YEARS
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

3271_06b (02/08/01)

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FIGURE 8.11-7a
EXISTING VIEW FROM KOP5
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

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3271_07a (02/08/01)

FIGURE 8.11-7b
VISUAL SIMULATION OF PROJECT FROM KOP5 AT 10 YEARS
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

3271_07b (02/08/01)

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FIGURE 8.11-8a
EXISTING VIEW FROM KOP6
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

3271_08a (02/08/01)

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FIGURE 8.11-8b
VISUAL SIMULATION OF PROJECT FROM KOP6 AT 10 YEARS
APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

3271_08b (02/08/01)

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8.12 Hazardous Materials Handling

This section evaluates the potential effects on human health and the environment from the storage and use of hazardous materials in conjunction with EAEC.

Section 8.12.1 describes the existing environment that may be affected, and Section 8.12.2 identifies potential impacts on that environment and on human health from EAEC development. Section 8.12.3 discusses the offsite migration modeling protocol. Section 8.12.4 discusses fire and explosion risk. Section 8.12.5 investigates potential cumulative impacts, and Section 8.12.6 presents proposed mitigation measures. Section 8.12.7 presents the LORS applicable to hazardous materials, and Section 8.12.8 describes the agencies involved and provides agency contacts. Section 8.12.9 describes permits required and the permit schedule. Section 8.12.10 provides the references used to develop this section.

8.12.1 Affected Environment

The project site is located in the far eastern corner of Alameda County, approximately 8 miles northwest of the City of Tracy, 12 miles east of Livermore, 5 miles south of Byron, and less than 1 mile from the San Joaquin County border (Figure 2.1-1). Land use in the surrounding area (discussed in detail in Sections 8.4 and 8.9) is agricultural. Large infrastructure projects in the area include the Western Area Power Administration (Western) substation; two pumping stations for the Delta-Mendota Canal and the California Aqueduct; PG&E's gas compressor station; numerous windfarms; and several high-voltage transmission lines. The EAEC site is not located within a FEMA-designated 100-year flood plain.

There are few sensitive receptor facilities (such as schools, daycare facilities, convalescent centers, or hospitals) in the vicinity of the project site. The nearest sensitive receptor is an elementary school located just under 1.0 mile south of the project site. There are also a few residences (primarily farmers) in the vicinity of the site. Sensitive receptors within a 3-mile radius of the project site are shown on Figure 8.6-1 (see Section 8.6), and descriptions of the receptors are presented in Table 8.12-1.

TABLE 8.12-1
Sensitive Receptors within a 3-mile Radius of the EAEC Site

Sensitive Receptor Type	Map No.	Name	Phone Number	Address	Enrollment/ No. People Serviced
Schools	1	Mountain House School District	209-835-2283	3950 Mountain House Rd	44

8.12.2 Potential Environmental and Human Health Effects

Hazardous materials to be used at EAEC during construction and operation were evaluated for hazardous characteristics. That evaluation is discussed in this section. Some of these materials will be stored at the generating site continuously. Others will be brought onsite for the initial startup and periodic maintenance (every 3 to 5 years). Some materials will be used only during startup. Hazardous materials will not be stored or used in the gas supply line, water supply line, or electric transmission line corridors during operations. Storage locations are described in Table 8.12-2. Table 8.12-3 presents information about these materials, including trade names; chemical names; Chemical Abstract Service (CAS) numbers; maximum quantities onsite; reportable quantities (RQs); La Follette Bill threshold planning quantities (TPQs); and status as a Proposition 65 chemical (a chemical known to be carcinogenic or cause reproductive problems in humans). Figure 8.12-1 illustrates storage locations for the hazardous materials that will be used at EAEC. Toxicity characteristics and the exposure level criteria for acutely hazardous chemicals are shown in Table 8.12-4. Health hazards and flammability data are summarized in Table 8.12-5. Table 8.12-5 also contains information on incompatible chemicals (e.g., sodium hypochlorite and ammonia). Measures to mitigate the potential effects from the hazardous materials are presented in Section 8.12.6.

8.12.2.1 Construction Phase

During construction of the project and linears, acutely hazardous materials, as defined in California's Health and Safety Code, Section 25531, will not be used. Therefore, no discussion of acutely hazardous materials storage or handling is included in this section.

Hazardous materials to be used during construction of the project and its associated linear facilities will be limited to gasoline, diesel fuel, motor oil, hydraulic fluid, solvents, cleaners, sealants, welding flux, various lubricants, paint, and paint thinner. There are no feasible alternatives to motor fuels and oils for operating construction equipment. The types of paint required are dictated by the types of equipment and structures that must be coated and by the manufacturers' requirements for coating.

The quantities of hazardous materials that will be onsite during construction are small, relative to the quantities used during operation. Construction personnel will be trained to handle the materials properly. The most likely possible incidents will involve the potential for fuels, oil, and grease dripping from construction equipment. The small quantities of fuel, oil, and grease that might drip from construction equipment will have relatively low toxicity and will be biodegradable. Therefore, the expected environmental impact is minimal.

Small oil spills may also occur during onsite refueling. Equipment refueling will be performed away from water bodies to prevent contamination of water in the event of a fuel spill. Therefore, the potential environmental effects from fueling operations are expected to be limited to small areas of contaminated soil. If a fuel spill occurs on soil, the contaminated soil will be placed into barrels or trucks for offsite disposal as a hazardous waste. The worst-case scenario for a chemical release from fueling operations would be a vehicle accident involving a service or refueling truck. Handling procedures for the hazardous materials to be used onsite during construction are presented in Section 8.12.6.1.

The quantities of hazardous materials that will be handled during construction are relatively small and BMPs will be implemented by contractor personnel. Therefore, the potential for environmental effects is expected to be small.

TABLE 8.12-2
Location of Hazardous Materials

Chemical	Use	Storage Location	State	Type of Storage
Aluminum Sulfate, Sodium Aluminate, or Polyaluminum Chloride	Coagulant for plant makeup water	Water treatment facility	Liquid	Continuously Onsite
Ammonium Bifluoride	Cleaning of HRSG, initial startup and once every 3 to 5 years	Near each HRSG	Solid Crystals	Initial Startup and Periodically Onsite
Anhydrous Ammonia (99 % NH_3)	Control oxides of nitrogen (NOx) emissions through selective catalytic reduction	Outside, east of the easternmost HRSG	Liquid	Continuously Onsite
Anti-Foam (e.g. NALCO 71 D5 ANTIFOAM)	Brine concentrator to control foaming	Water treatment facility	Liquid	Continuously Onsite
Antifreeze	Closed loop cooling systems	Water treatment facility	Liquid	Continuously Onsite
Calcium Chloride	Brine concentrator water chemistry adjustment	Water treatment facility	Solid	Continuously Onsite
Calcium Oxide or Calcium Hydroxide	Clarifier/softener chemical	Outside near water treatment facility	Solid	Continuously Onsite
Calcium Sulfate	Brine concentrator initial startup seeding	Water treatment facility	Solid	Initial Startup and Periodically Onsite
Chelating Agents (EDTA)	Brine concentrator cleaner	Water treatment facility	Liquid	Continuously Onsite
Citric Acid	Cleaning of HRSG, initial startup and once every 3 to 5 years	Near each HRSG	Solid Powder	Initial Startup and Periodically Onsite
Cleaning chemicals/detergents	Periodic cleaning of HRSG and combustion turbine	Water treatment facility/laboratory/maintenance shop	Liquid	Continuously Onsite
Coagulant Aid Polymer (e.g., NALCO NALCOLYTE 8799)	Coagulant for plant makeup water	Water treatment facility	Liquid	Continuously Onsite
Diesel No. 2	Fuel for fire pump engine/vehicles	Near fire pump	Liquid	Continuously Onsite
Disodium Phosphate(Na_2HPO_4)	Boiler water alkalinity control	Water treatment facility/laboratory	Granular Solid	Continuously Onsite
Ferric Chloride or Ferric Sulfate	Coagulant for plant makeup water	Water treatment facility	Liquid	Continuously Onsite
Filter Aid Polymer (e.g. NALCO NALCLEAR 7763)	Used for multi-media filter maintenance	Water treatment facility	Liquid	Continuously Onsite
Formic acid	Cleaning of HRSG	Near each HRSG	Liquid	Prior to Initial Startup
Hydraulic Oil	High-pressure combustion turbine starting system, turbine control valve actuators	Contained within equipment	Liquid	Continuously Onsite
Hydrochloric Acid	Cleaning of HRSG, initial startup and once every 3 to 5 years; small quantity kept onsite for maintenance	Near each HRSG and Water treatment facility	Liquid	Initial Startup and Periodically Onsite; Small quantity continuously onsite

TABLE 8.12-2
Location of Hazardous Materials

Chemical	Use	Storage Location	State	Type of Storage
Hydrogen	Cooling medium for Combustion turbine and steam turbine hydrogen-cooled generators	Outside, east of HRSGs	Gas	Continuously Onsite
Hydroxyacetic acid	Cleaning of HRSGs; small quantity kept onsite for maintenance	Near each HRSG and Water treatment facility	Solid Crystals	Prior to Initial Startup; Small quantity continuously onsite
Laboratory reagents	Water/wastewater laboratory analysis	Water treatment facility/laboratory	Liquid and Granular Solid	Continuously Onsite
Lubricating Oil	Lubricate rotating equipment (e.g., gas turbine and steam turbine bearings)	Contained within equipment	Liquid	Continuously Onsite
Magnesium Oxide or Magnesium Hydroxide	Process water pre-treatment (silica removal)	Water treatment facility	Liquid	Continuously Onsite
Mineral Insulating Oil	Transformers/switchyard	Contained within transformers and switches	Liquid	Continuously Onsite
Neutralizing amines (e.g NALCO 356	Corrosion control of condensate piping	Near main steam pipes of HRSG boilers	Liquid	Continuously Onsite
Non-Oxidizing Biocide (e.g. NALCO 7330)	Cooling tower biological control	Cooling tower chemical facility	Liquid	Continuously Onsite
Oxygen Scavenger (e.g. NALCO ELIMIN-OX)	Oxygen scavenger for use in process feedwater to deaerator	Water treatment facility	Liquid	Continuously Onsite
Phosphonate (e.g. NALCO 7385)	Antiscalant for use in reverse osmosis unit	Water treatment facility	Liquid	Continuously Onsite
Scale Inhibitor (Polyacrylate)	Cooling tower scale inhibitor	Cooling tower chemical facility	Liquid	Continuously Onsite
Sodium Bisulfite or Sodium Sulfite	Dechlorination of reverse osmosis feedwater	Water treatment facility	Liquid	Continuously Onsite
Sodium Bromide	Cooling tower biocide and process water pretreatment	Cooling tower chemical facility and water treatment facility	Liquid	Continuously Onsite
Sodium Carbonate	Reactor clarifier/softener chemical and cleaning of HRSG, initial startup and once every 3 to 5 years	Water treatment facility and near each HRSG	Solid Powder	Initial Startup and Continuously Onsite
Sodium Hexameta Phosphate	Boiler water alkalinity control	Water treatment facility/laboratory	Granular Solid	Continuously Onsite
Sodium Hydroxide (NaOH)	Demineralizer resin regeneration (if onsite regeneration used), pH neutralization, and reactor clarifier/softener chemical	Water treatment facility/laboratory	Liquid	Continuously Onsite
Sodium Hypochlorite (NaOHCl)	Biocide for circulating water system and process water pretreatment	Cooling tower chemical facility and water treatment facility	Liquid	Continuously Onsite

TABLE 8.12-2
Location of Hazardous Materials

Chemical	Use	Storage Location	State	Type of Storage
Sodium Nitrate	Cleaning of HRSG, initial startup and once every 3 to 5 years	Near each HRSG	Solid Crystals	Initial Startup and Periodically Onsite
Sodium Nitrite	Chemical cleaning of heat recovery steam generators	Outside near heat recovery steam generators	Solid	Initial startup and periodically onsite
Sodium Sulfate	Brine concentrator water chemistry adjustment	Water treatment facility	Solid	Continuously Onsite
Stabilized Bromine (e.g. NALCO STABREX ST70)	Biocide for circulating water system and process water pretreatment	Cooling tower chemical facility and water treatment facility	Liquid	Continuously Onsite
Sulfur Hexafluoride	Switch gear devices	Contained within equipment	Liquid	Continuously Onsite
Sulfuric Acid (H_2SO_4)	Circulating water pH control, demineralizer resin regeneration (if onsite regeneration used), pH neutralization	Outside, near cooling tower chemical facility and water treatment facility	Liquid	Continuously Onsite
Trisodium Phosphate (Na_3PO_4)	Boiler water alkalinity control	Water treatment facility/laboratory	Granular Solid	Continuously Onsite

TABLE 8.12-3
EAEC Chemical Inventory

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	LaFollette Bill TPQ[c]	Prop 65
Acutely Hazardous Materials							
Anhydrous Ammonia	Anhydrous Ammonia	7664-41-7 (NH_3)	24,000 gal.	100 lb.	100 lb.	500 lb.	No
Neutralizing Amines (e.g. NALCO 356)	Cyclohexylamine (20 to 40%)	108-91-8	800 gal.	10,000 lb.	25,000 lb.	10,000 lb.	No
	Morpholine (5 to 10%)	110-91-8		[d]	[d]	[d]	No
Sulfuric Acid	Sulfuric Acid (93%)	7664-93-0	16,000 gal.	1,000 lb.	1,075 lb.	[d]	No
Hazardous Materials							
Aluminum Sulfate[g]	Aluminum Sulfate	10043-01-3	3,000 gal.	5,000 lb.	5,000 lb.	[d]	No
Ammonium Bifluoride	Ammonium Bifluoride	1341-49-7	200 pounds initially and once every 3 to 5 years	100 lb.	100 lb.	[d]	No
Anti-Foam (e.g. NALCO 71 D5 ANTIFOAM)	Hydrotreated light distillate (10-20%)	6742-47-8	800 gal.	[d]	[d]	[d]	No
	n-Decanol (1-5%)	112-30-1		[d]	[d]	[d]	No
	n-Octanol (5-10%)	118-87-5		[d]	[d]	[d]	No
Antifreeze	Propylene Glycol	57-55-6	55 gal.	[d]	[d]	[d]	No
Calcium Chloride	Calcium Chloride	10043-52-4	4,000 lbs.	[d]	[d]	[d]	No
Calcium Hydroxide[g]	Calcium Hydroxide	1305-62-0	50 tons	[d]	[d]	[d]	No
Calcium Oxide[g]	Calcium Oxide	1305-78-8	50 tons	[d]	[d]	[d]	No
Calcium Sulfate	Calcium Sulfate	10101-41-4	4,000 lbs.	[d]	[d]	[d]	No
Chelating Agents	EDTA	60-00-4	55 gal.	5,000 lb.	5,000 lb.	[d]	No
Citric Acid	Citric Acid	77-92-9	100 lb.	[d]	[d]	[d]	No
Cleaning Chemicals/Detergents	Various	None	100 gal.	[d]	[d]	[d]	No

TABLE 8.12-3
EAEC Chemical Inventory

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	LaFollette Bill TPQ[c]	Prop 65
Coagulant Aid Polymer (e.g. NALCO NALCOLYTE 8799)	Sodium Chloride	7647-14-5	800 gal.	[d]	[d]	[d]	No
	Polyquaternary Amine	20507700000-5062P		[d]	[d]	[d]	
Diesel No. 2	Oil	None	500 gal.	42 gal.[e]	[f]	[d]	Yes
Disodium Phosphate	Sodium Phosphate, Dibasic	7558-79-4	500 lb.	5,000 lb.	5,000 lb.	[d]	No
Ferric Chloride[g]	Ferric Chloride	7705-08-0	3,000	1,000 lb.	1,000 lb.	[d]	No
Ferric Sulfate[g]	Ferric Sulfate	10028-22-5	3,000	1,000 lb.	1,000 lb.	[d]	No
Filter Aid Polymer (e.g. NALCO NALCLEAR 7763)	Hydrotreated light distillate	64742-47-8	800 gal.	[d]	[d]	[d]	No
	Ethoxylated C10-16 Alcohols	68002-97-1		[d]	[d]	[d]	No
	Acrylic Polymer	20507700000-5027P		[d]	[d]	[d]	No
Formic Acid	Formic Acid	64-18-6	600 pounds prior to startup; 100 gals on a regular basis	5,000 lb.	5,000 lb.	[d]	No
Hexametaphosphate	Sodium Hexametaphospate	10124-56-8	500 lb.	[d]	[d]	[d]	No
Hydraulic Oil	Oil	None	1, 000 gal.	42 gal.	[f]	[d]	No
Hydrochloric Acid	Hydrochloric Acid (30%)	7647-01-0	10,000 pounds initially and once every 3 to 5 years; 55 gal. on a regular basis	5,000 lb.	16,667 lb.	[d]	No
Hydrogen	Hydrogen	1333-74-0	1,320 lb.	[d]	[d]	10, 000 lb.	No
Hydroxyacetic Acid	Gyrolic Acid	None	1000 pounds prior to startup; 100 gals on a regular basis	[d]	[d]	[d]	No

TABLE 8.12-3
EAEC Chemical Inventory

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	LaFollette Bill TPQ[c]	Prop 65
Laboratory Reagents (liquid)	Various	None	10 gal.	[d]	[d]	[d]	No
Laboratory Reagents (solid)	Various	None	100 lb.	[d]	[d]	[d]	No
Lubrication Oil	Oil	None	30,000 gal.	42 gal.[e]	[f]	[d]	Yes
Magnesium Hydroxide[g]	Magnesium Hydroxide	1309-42-8	800 gal.	[d]	[d]	[d]	No
Magnesium Oxide[g]	Magnesium Oxide	1309-48-4	800 gal.	[d]	[d]	[d]	No
Mineral Insulating Oil	Oil	8012-95-1	100,000 gal.	42 gal.[e]	[f]	[d]	Yes
Non-Oxidizing Biocide (e.g. NALCO 7330)	5-Chloro-2-Methyl-4-Isothiazolin-3-one (1.1%)	26172-55-4	800 gal.	[d]	[d]	[d]	No
	2-Methyl-4-Isothiazolin-3-one (0.3%)	2682-20-4		[d]	[d]	[d]	No
Oxygen Scavenger (e.g. NALCO ELIMIN-OX)	Carbohydrazide	497-18-7	800 gal.	[d]	[d]	[d]	No
Phosphonate (e.g. NALCO 7385)	2-Phosphono-1,2,4-Butanetricarboxylic acid (45-50%)	37971-36-1	800 gal.	[d]	[d]	[d]	No
Polyaluminum Chloride[g]	Polyaluminum Chloride	None	3,000 gal.	[d]	[d]	[d]	No
Scale Inhibitors (various)	Polyacrylate	Various	3,000 gal.	[d]	[d]	[d]	No
Sodium Aluminate[g]	Sodium Aluminate	1302-42-7	3,000 gal.	[d]	[d]	[d]	No
Sodium Bisulfite (e.g. NALCO 7408)	Sodium Bisulfite (40 to 70%)	7631-90-5	800 gal.	5,000 lb.	7,143 lb.	[d]	No
Sodium Bromide	Sodium Bromide	7647-15-6	2,000 gal.	[d]	[d]	[d]	No
Sodium Carbonate (Soda Ash)	Sodium Carbonate	497-19-8	50 tons	[d]	[d]	[d]	No
Sodium Hydroxide	Sodium Hydroxide (50%)	1310-73-2	8,000 gal.	1,000 lb.	2,000 lb.	[d]	No
Sodium Hypochlorite (Bleach)	Sodium Hypochlorite (10%)	7681-52-9	8,000 gal.	100 lb.	1,000 lb.	[d]	No

TABLE 8.12-3
EAEC Chemical Inventory

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	LaFollette Bill TPQ[c]	Prop 65
Sodium Nitrate	Sodium Nitrate	7631-99-4	500 pounds initially and once every 3 to 5 years	[d]	[d]	[d]	No
Sodium Nitrite	Sodium Nitrite	7632-00-0	500 lb.	100 lb.	100 lb.	[d]	No
Sodium Sulfate	Sodium Sulfate	7757-82-6	4,000 lb.	[d]	[d]	[d]	No
Sodium Sulfite[g]	Sodium Sulfite	7757-83-7	800 gal.	[d]	[d]	[d]	No
Stabilized Bromine (NALCO STABREX ST70)	Sodium Hydroxide (1 to 5%)	1310-73-2	2,000 gal.	1,000 lb.	20,000 lb.	[d]	No No
Sulfur Hexafluoride	Sulfur Hexafluoride	2551-62-4	200 lb.	[d]	[d]	[d]	No
Trisodium Phosphate	Sodium Phosphate, Tribasic	7601-54-9	500 lb.	5,000 lb.	5,000 lb.	[d]	No

[a]Reportable quantity for a pure chemical, per the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) [Ref. 40 CFR 302, Table 302.4]. Release equal to or greater than RQ must be reported. Under California law, any amount that has a realistic potential to adversely affect the environment or human health or safety must be reported.

[b]Reportable quantity for materials as used onsite. Since some of the hazardous materials are mixtures that contain only a percentage of a reportable chemical, the reportable quantity of the mixture can be different than for a pure chemical. For example, if a material only contains 10% of a reportable chemical and the RQ is 100 lbs., the reportable quantity for that material would be (100 lbs.)/(10%) = 1,000 lbs.

[c]Threshold Planning Quantity [Ref. 40 CFR Part 355, Appendix A]. If quantities of extremely hazardous materials equal to or greater than TPQ are handled or stored, they must be registered with the local Administering Agency.

[d]No reporting requirement. Chemical has no listed RQ or TPQ.

[e]State reportable quantity for oil spills that will reach California state waters [Ref. CA Water Code Section 13272(f)]

[f]Per the California Water Quality Control Board Region 5, they would like all oil spills to surface water reported, even if they are less than the state reportable quantity of 42 gals.

[g]Some of the chemicals have alternatives (See table 8.12-2), thus the maximum quantity stored onsite can be zero if an alternative chemical is being used.

TABLE 8.12-4
Acutely Hazardous Materials

Name	Toxic Effects	Exposure Levels
Anhydrous Ammonia	Toxic effects for contact with pure liquid or vapor causes eye, nose, and throat irritation, skin burns, and vesiculation. Ingestion or inhalation causes burning pain in mouth, throat, stomach, and thorax, constriction of thorax, and coughing followed by vomiting blood, breathing difficulties, convulsions, and shock. Other symptoms include dyspnea, bronchospasms, pulmonary edema, and pink frothy sputum. Contact or inhalation overexposure can cause burns of the skin and mucous membranes, and headache, salivation, nausea, and vomiting. Other symptoms include labored breathing, bloody mucous discharge, bronchitis, laryngitis, hemmoptysis, and pneumonitis. Damage to eyes may be permanent, including ulceration of conjunctiva and cornea and corneal and lenticular opacities.	Occupational Exposures PEL = 35 mg/m3 OSHA TLV = 18 mg/m3 ACGIH TWA = 18 mg/m3 NIOSH STEL = 35 mg/m3 Hazardous Concentrations IDLH = 300 ppm LD50 = 350 mg/kg - oral, rat ingestion of 3 to 4 ml may be fatal Sensitive Receptors ERPG-1 = 25 ppm ERPG-2 = 200 ppm ERPG-3 = 1,000 ppm
Sulfuric Acid	Irritates eyes, nose, and throat. Ingestion and inhalation may cause pulmonary edema, bronchitis, emphysema, conjunctivitis, stomatis, dental erosion, and tracheobronchitis. Contact causes severe burns of the skin and eyes, and dermatitis.	Occupational Exposures PEL = 1 mg/m3 OSHA STEL = 3 mg/m3 Hazardous Concentrations IDLH = 80 mg/m3 TCLO = 3 mg/m3/24 weeks inhalation human LDLO = 135 mg/kg – man Sensitive Receptors ERPGs = Not Available
Cyclohexylamine	Caustic/corrosive to skin, eyes, and mucous membranes. Systemic effects include nausea, vomiting, anxiety, restlessness, and drowsiness.	Occupational Exposures PEL = 40 mg/m3 OSHA TLV = 40 mg/m3 ACGIH TWA = 10 ppm STEL = None set Hazardous Concentrations LD50 = 779 mg/kg – oral, albino rates LD50 = 2,055 mg/kg – dermal, albino rabbits Sensitive Receptors ERPGs = Not Available

ACGIH = American Conference of Government Industrial Hygienists
ERPG = Emergency Response Planning Guideline
ERPG-1 = Maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects
ERPG-2 = Maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without developing irreversible or serious health effects
ERPG-3 = Maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing life-threatening health effects
IDLH = Immediately dangerous to life and health
LD_{50} = Dose lethal to 50 percent of those tested
LDLO = Lowest published lethal dose
mg/kg = Milligrams per kilogram
mg/m^3 = Milligrams per cubic meter
NIOSH = National Institute of Occupational Safety and Health
PEL = OSHA permissible exposure limit for 8-hr workday
ppm = parts per million
STEL = Short-term exposure limit, 15-min. exposure
TCLO = Lowest published toxic concentration
TLV = ACGIH threshold limit value for 8-hr workday
TWA = NIOSH time-weighted average for 8-hr workday

TABLE 8.12-5
Toxicity of Hazardous and Acutely Hazardous Materials

Hazardous Materials	Physical Description	Health Hazard	Reactive & Incompatibles	Flammability [a]
Anhydrous Ammonia	Colorless gas with pungent odor.	*Corrosive*: Irritation to permanent damage from inhalation, ingestion, and skin contact.	Acids, halogens (e.g. chlorine), strong oxidizers, salts of silver and zinc.	Combustible, but difficult to burn.
Aluminum Sulfate	Liquid.	*Toxic*: Moderately toxic by ingestion.	None.	Non-flammable.
Ammonium Bifluoride	White Crystals.	*Corrosive, Toxic*: Caustic poison and strong irritant.	None.	Non-flammable.
Anti-Foam (e.g. NALCO 71 D5 Antifoam)	Clear, light yellow	Causes irritation to skin and eyes	Strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorates, concentrated oxygen, permaganates)	Combustible
Antifreeze	Colorless, odorless viscuous liquid	Causes irritation	Strong oxidizing agents	Flammable?
Calcium Chloride	Odorless small white flakes	Dust/mist may cause irritation to upper respiratory tract.	Will absorb water when exposed to atmosphere – release ammonia vapors Metals slowly corrode in aqueous solution	Non-flammable
Calcium Hydroxide	White powder	*Corrosive:* Causes burn. Skin, eye, and respiratory irritant.	Strong acids (hydrochloric, nitric, and sulfuric acids)	Non-flammable
Calcium Oxide	White to grey solid	Harmful is swallowed. Skin, eye, and respiratory irritant. Causes burns.	Water, fluorine, strong acids	Non-combustible
Calcium Sulfate	White granules; odorless	May cause impaired sense of smell and taste, respiratory tract irritation, dermatitis and conjunctivitis	Diazomethane (vapor) and Phosphorous (red)	Non-flammable
Chelating Agent (EDTA)	White powder, odorless	Dust may be irritating to eyes and mucous membranes	None specified	Non-flammable
Citric Acid	Translucent crystals.	None.	None.	Non-flammable.
Cleaning Chemicals/Detergents	Liquid.	Refer to individual chemical labels.	Refer to individual chemical labels.	Refer to individual chemical labels.
Coagulant Aid Polymer (e.g. NALCO NALCOLYTE 8799)	Liqht yellow liquid	May cause irritation to skin and eyes with prolonged contact.	Strong oxidizers	Non-flammable
Diesel No. 2	Oily, light liquid.	May be carcinogenic.	Sodium hypochlorite.	Flammable.
Disodium Phosphate	White powder.	*Toxic*: Toxic by ingestion.	None.	Non-flammable.
Oxygen Scavenger (e.g. NALCO ELIMIN-OX)	Colorless liquid.	*Toxic*: Slightly toxic, low human hazard.	Mineral acids, nitrites, and strong oxidizers.	Non-flammable.
Ferric Chloride	Clear, yellow-orange liquid	*Corrosive:* Causes burns to eyes and skin. Ingestion may cause stomach pain, nausea, vomiting, shock, and diarrhea.	Heat and evaporation	Non-flammable

TABLE 8.12-5
Toxicity of Hazardous and Acutely Hazardous Materials

Hazardous Materials	Physical Description	Health Hazard	Reactive & Incompatibles	Flammability [a]
Ferric Sulfate	Dark reddish-brown solution with mild odor	*Corrosive:* May cause irritation to mucous membranes, respiratory tract and lung tissue if inhaled or burns to skin and eyes. Ingestion can cause stomach irritation, digestive tract burns, liver cirrhosis and fibrosis of pancreas.	Cast iron/bronze, brass, 304ss, hastelloy B, copper and alloys, galvanized steel, aluminum, paints, enamels, and concrete.	Non-flammable
Filter Aid Polymer (e.g. NALCO NALCLEAR 7763)	Off-white/opaque liquid	May cause irritation to skin and eyes with prolonged contact.	Water and strong oxidizers	Non-flammable
Formic Acid	Colorless, fuming liquid.	*Corrosive*: Irritant to skin and tissue.	Strong oxidizers, strong caustics, concentrated sulfuric acid.	Combustible.
Hydraulic Oil	Oily, dark liquid.	Hazardous if ingested.	Sodium hypochlorite.	Combustible.
Hydrochloric Acid	Colorless, pungent, fuming liquid.	*Strongly Corrosive and Toxic*: Toxic by ingestion. Strong irritant to eyes and skin.	Metals, hydroxides, amines, alkalis.	Non-flammable.
Hydrogen	Colorless gas	May cause nausea, vomiting, dizziness, tingling sensation, suffocation, convulsions, or coma	Metals, oxidizing materials, metal oxides, combustible materials, halogens, metal salts, or halo carbons and heat , flames, or other sources of ignition.	Flammable
Hydroxyacetic Acid	Colorless crystals.	*Corrosive and Toxic*: Toxic by inhalation, ingestion, and dermal contact. Irritant to skin and tissue.	Strong bases, strong reducing and oxidizing agent.	Combustion is possible at elevated temperatures or if in contact with an ignition source.
Laboratory Reagents	Liquid and solid.	Refer to individual chemical labels.	Refer to individual chemical labels.	Refer to individual chemical labels.
Lubrication Oil	Oily, dark liquid.	Hazardous if ingested.	Sodium hypochlorite.	Flammable.
Magnesium Hydroxide	Odorless white powder	None identified. Avoid contact with eyes, skin, and clothing.	None documented	Non-flammable
Magnesium Oxide	White to light-gray powder	Causes irritation to eyes, skin, and respiratory tract.	Air, bromine trifluoride and trichloride, phophorous pentachloride, oxidizers	May ignite and explode when heated with sublimed sulfur, magnesium powder, or aluminum powder.
Mineral Insulating Oil	Oily, clear liquid.	Minor health hazard.	Sodium hypochlorite.	Can be combustible, depending on manufacturer.
Neutralizing Amine (e.g. NALCO 356)	Clear, light yellow/green liquid.	*Corrosive*: Irritation to eyes and skin. Can cause kidney damage.	Strong oxidizers and acids. SO_2 or acidic bisulfite products.	Flammable.
Non-Oxidizing Biocide (e.g. NALCO 7330)				

TABLE 8.12-5
Toxicity of Hazardous and Acutely Hazardous Materials

Hazardous Materials	Physical Description	Health Hazard	Reactive & Incompatibles	Flammability [a]
Phosphonate (e.g. NALCO 7385)	Colorless liquid	May cause skin or eye irritation with prolonged contact	Strong alkalies (e.g. ammonia and its solutions, carbonates, sodium hydroxide (caustic), potassium hydroxide, calcium hydroxide (lime), cyanide, sulfide, hypochlorites, chorites), and metals.	Non-flammable
Polyaluminum Chloride	Clear to pale yellow odorless liquid	Causes irritation to skin, eyes, and respiratory tract	Metals, alkalis (e.g. ammonia and its solutions, carbonated, sodium hydroxide, potassium hydroxide, chlorites)	Non-flammable
Scale Inhibitors (various)	Yellow green liquid.	*Corrosive and Toxic*: Slight to moderate toxicity. Irritation to skin and eyes.	Strong acids.	Non-flammable.
Sodium Aluminate	Straw colored liquid	Strong irritant to tissue	Acids and strong oxidizing agents	Non-flammable
Sodium Bisulfite	Yellow liquid	*Corrosive:* Irritation to eyes, skin, and lungs. May be harmful if digested	Strong acids and strong oxidizing agents	Non-flammable
Sodium Bromide	White crystals, granules, or powder; odorless	Causes irritation to skin, eyes, and respiratory tract. Can cause damage to central nervous system if ingested.	Acids, alkaloidal and heavy metal salts, oxidizers, and bromine trifluoride	Non-flammable
Sodium Carbonate	White crystals or powder.	*Corrosive and Toxic:* Mildly toxic by ingestion. Irritation to skin and eyes.	Aluminum, Phosphorus (V) Oxide, Sulfuric Acid, Fluorine, Lithium, 2,4,6-trinitrotoluene.	Non-flammable.
Sodium Hexametaphosphate	White odorless powder	Skin, eye, and mucous membrane irritant. Ingestion may cause nausea, vomiting, or diarrhea	None documented	Non-flammable
Sodium Hydroxide	Clear yellow liquid.	*Corrosive*: Irritant to tissue in presence of moisture. Strong irritant to tissue by ingestion.	Water, acids, organic halogens, some metals.	Non-flammable.
Sodium Hypochlorite (Bleach)	Pale green; sweet, disagreeable odor. Usually in solution with H_2O or sodium hydroxide.	*Corrosive and Toxic*: Toxic by ingestion. Strong irritant to tissue.	Ammonia and organic materials.	Fire risk when in contact with organic materials.
Sodium Nitrate	Colorless Crystals.	*Toxic*: Mildly toxic by ingestion.	Acetic Anhydride, Aluminum Powder, Antimony Powder, Barium Thiocyanate, Cyanides, Bitumen, Boron Phosphide, Magnesium, Metal Amidosulfates, Organic Matter, Perosyformic Acid, Sodium Hypophosphite, Wood.	Non-flammable.

TABLE 8.12-5
Toxicity of Hazardous and Acutely Hazardous Materials

Hazardous Materials	Physical Description	Health Hazard	Reactive & Incompatibles	Flammability [a]
Sodium Nitrite	White or slightly yellow, hygroscopic; odorless	Causes irritation of skin, eyes, and respiratory tract.	Acids, ammonium compounds, reducing agents, high heat, and sources of ignition	Non-combustible
Sodium Sulfate	White granular solid with no odor	*Toxic:* Causes irritation of skin, eyes, and respiratory tract. May be harmful if swallowed. Potential carcinogen.	Aluminum powder and molten sodium sulfate	Non-flammable
Sodium Sulfite	White crystals or powder with no odor	May cause irritation of skin, eyes, and mucous membranes. Ingestion may cause gastrointestinal irritation.	Strong oxidizing agents and strong acids	Non-flammable
Stabilized Bromine (NALCO STABREX ST70)	Clear, light yellow liquid.	*Corrosive*: Irritant to eyes and skin. Harmful if ingested or inhaled.	Strong acids. Organic materials. Sodium hypochlorite.	Non-flammable.
Sulfur Hexafluoride	Colorless gas with no odor.	Hazardous if inhaled.	Disilane.	Non-flammable.
Sulfuric Acid	Colorless, dense, oily liquid.	*Strongly Corrosive*: Strong irritant to all tissue. Minor burns to permanent damage to tissue.	Organic materials, chlorates, carbides, fulminates, metals in powdered form. Reacts violently with water.	Non-flammable.
Trisodium Phosphate	Colorless crystals.	*Corrosive and Toxic*: Toxic by ingestion. Irritant to tissue.	None.	Non-flammable.

Data was obtained from Material Safety Data Sheets (MSDSs) and "*Hazardous Chemical Desk Reference*, 2nd Edition", by Richard J. Lewis, Sr. 1991.

[a] Per Department of Transportation regulations, under 49 CFR 173: "Flammable" liquids have a flash point less than or equal to 141 F; "Combustible" liquids have a flash point greater than 141 F.

8.12.2.2 Operations Phase

Several hazardous materials, including three acutely hazardous materials, will be stored at the generating site during EAEC operation. Most of the hazardous materials that will be stored onsite are corrosive and are a threat to humans, particularly workers at the site, if inhaled, ingested, or contacted by skin. The hazardous characteristics of materials being used at the site are summarized in Table 8.12-5. Table 8.12-5 also contains information on incompatible chemicals (e.g., sodium hypochlorite and ammonia). Mixing incompatible chemicals can generate toxic gases. Measures to keep incompatible chemicals separated include separate storage and containment areas and/or berming (see Section 8.12.6).

Potential environmental and/or human health effects could be caused by accidental releases, accidental mixing of incompatible chemicals, fires, and injury to facility personnel from contact with a hazardous material. The accidental release of the acutely hazardous material anhydrous ammonia might present the most serious potential for effects on the environment and/or human health.

Pure ammonia (NH_3) is a volatile, acutely hazardous chemical that is stored under pressure as a liquid and becomes a toxic gas if released. The odor threshold of ammonia is about 5 ppm, and minor irritation of the nose and throat will occur at 30 to 50 ppm. Concentrations greater than 140 ppm will cause detectable effects on lung function even for short-term exposures (0.5 to 2 hours).

At higher concentrations of 700 to 1,700 ppm, ammonia gas will cause severe effects; death occurs at concentrations of 2,500 to 7,000 ppm. The hazard to facility workers will be mitigated by facility safety equipment, hazardous materials training, and emergency response planning (see Section 8.7, Worker Health and Safety). In a catastrophic accident, toxic ammonia gas could migrate offsite and affect the health of humans at locations surrounding the facility (see Section 8.12.3). Facility design will minimize the potential for harm to humans located offsite (see Section 8.12.6.2).

Neutralizing amines (e.g., NALCO 356) contains cyclohexylamine, which is classified as an acutely hazardous material. Cyclohexylamine is corrosive to the eyes and skin and, depending on the length of exposure, can cause permanent eye damage and third degree burns to the skin. However, this chemical is not particularly volatile, and is soluble in water, which constitutes 50 to 75 percent of NALCO 356. The maximum quantity of neutralizing amines stored onsite will be 800 gallons and the maximum quantity of pure cyclohexylamine will be 200 gallons. Because of the low volatility of these chemicals and the relatively small quantities stored, the offsite threat is considered small.

Sulfuric acid, a hazardous material, is a very corrosive chemical that can cause severe harm to humans if ingested, inhaled, or contacted. However, sulfuric acid has a very low vapor pressure and will not readily volatilize upon release. Therefore, the potential for harm to humans offsite is minimal.

The remaining materials in Table 8.12-3 are also considered to be hazardous, but they pose less threat to humans than anhydrous ammonia, cyclohexylamine, and sulfuric acid. Some materials (ammonium bifluoride, citric acid, sodium carbonate, and sodium nitrate) will be used at the site only during initial startup and during periodic maintenance (once every 3 to

5 years). Therefore, the potential for environmental or health effects will exist only during those rare occasions when the materials are onsite.

8.12.3 Offsite Migration Modeling

Because there is some human activity in the vicinity of the proposed EAEC site, a vulnerability analysis will be performed during the AFC process. The analysis will assess the risk to humans at various distances from the site if a spill or rupture of the anhydrous ammonia storage tank were to occur or if a spill from the supply truck were to occur while refilling the storage tank. Based on analyses submitted in previous CEC siting proceedings, the applicant is confident that an analysis for EAEC will show that there is minimal risk to people located offsite. If simulation modeling is required, the protocol will include the simulation of a tank rupture using a model designed to simulate gas evaporation from a pool of solution containing the gas. Possible models are ALOHA or a model from HG Systems. ALOHA was developed by the National Safety Council.

The worst-case scenario for modeling assumes the anhydrous ammonia storage tank is punctured, and the entire contents are released over a 10-minute span into a catch basin or bermed area located beneath the tank that will contain the entire contents of the tank. Other parameters include an atmospheric stability classification of "F" and a wind speed of 1.0 meter/second. Concentric distributions of the ammonia plume will be plotted around the ruptured tank at concentrations of 200, 300, 1,000, and 2,000 ppm. Based upon this analysis, mitigation measures will be selected to reduce risk to an acceptable level.

8.12.4 Fire and Explosion Risk

As shown in Table 8.12-5, many of the hazardous materials are noncombustible. Anhydrous ammonia, which constitutes the largest quantity of hazardous materials onsite (except for the mineral oil in the transformers), is incombustible in its liquid state. Ammonia evaporating as a gas from a leak or spill of the anhydrous solution is combustible within a narrow range of concentrations in air. However, the evaporation rate is sufficiently low that the lower explosive limit (LEL) will not be reached. Formic acid is combustible, but it will only be onsite prior to initial startup. The lubrication oil, diesel fuel, and neutralizing amines are flammable and will be handled in accordance with a Hazardous Materials Business Plan (HMBP) to be approved by Alameda County. Hydraulic oil, which is classified as combustible, will also be handled in compliance with the HMBP. With proper storage and handling of flammable materials in accordance with the HMBP, the risk of fire and explosion at the generating facility should be minimal.

The natural gas that will provide EAEC with fuel for the combustion turbines, for duct firing, for the emergency generator, and for the auxiliary boilers is flammable and could leak from the supply line that brings gas from PG&E's main pipeline. The risk of leakage is the normal type of risk encountered with transmitting natural gas via pipeline. Proper design, construction, and maintenance of the line will minimize leaks and the risk of fire or explosion. The line will be buried primarily in or adjacent to roadways.

Hydrogen gas will be used for cooling the combustion and steam turbine generators. The gas will be stored onsite outdoors on a "tube" trailer, which consists of a number of individual horizontal pressure vessels (i.e., "tubes") mounted on a trailer. The tubes contain compressed hydrogen gas, not liquid hydrogen. Compressed hydrogen gas is a flammable gas. Therefore, the tubes will be stored out of doors and will not be stored in the vicinity of any sources of ignition. Potential accidental release scenarios involve the leakage of hydrogen gas from its storage cylinders.

The closest fire station is the San Joaquin County Tracy Fire District at 520 N. Tracy Blvd. However, because the site is located in Alameda County, the primary responder will be Alameda County Fire Station No. 8 at 1617 College Avenue in the City of Livermore. Another alternative is the Contra Costa County East Diablo Fire District Station at 134 Oak St. in Brentwood. The Alameda County and Contra Costa County fire stations are approximately the same distance from the project site. In addition, the facility will enter into a mutual aid agreement with the cities of Byron and Tracy.

8.12.5 Cumulative Impacts

The primary potential cumulative impact from the use and storage of hazardous materials will be a simultaneous release from two or more sites of a chemical that will migrate offsite. Potentially, the two or more migrating releases could combine, thereby posing a greater threat to the offsite population than a single release by any single site. Hazardous materials that do not migrate, such as sulfuric acid, will not present a potential cumulative impact. The hazardous material with the potential to migrate offsite from EAEC is anhydrous ammonia. To determine the potential for cumulative impacts, other sites in the vicinity that store and use ammonia must be identified and analyzed. In addition, other chemicals in the vicinity with the ability to migrate offsite that could combine or interact with released ammonia must be identified and analyzed.

The closest facility of concern is Aqua Chlor, a chlorine repackaging plant located approximately 2.5 miles from the project site on Altamont Pass Road. Aqua Chlor stores up to 6,000 pounds of chlorine at their facility[1]. A simultaneous release from this tank and the proposed EAEC tank could cause cumulative impacts, if the migrating clouds merged. Ammonia can form an explosive mixture with chlorine gas. The potential effect of this low-probability event will be modeled, using the modeling protocol for ammonia (see Section 8.12.3). Other facilities in the regional area (between 5 and 10 miles from the project site) store chemicals that could potentially migrate and make a minor contribution to a cumulative release. These facilities and the associated chemicals are: All-Pure Chemical (chlorine, sulfur dioxide); the City of Tracy Wastewater Treatment Plant (ammonia, chlorine, sulfur dioxide); Costco Wholesale (ammonia); Tracy Biomass Plant (ammonia); Safeway Tracy Distribution Center (ammonia); Tracy Fresh Water Treatment Plant (chlorine); United Grocers (ammonia); and United States Cold Storage (ammonia).

8.12.6 Proposed Mitigation Measures

The following subsections present measures that the Applicant would implement during project construction and operation phases to mitigate risks in handling hazardous materials, particularly the risk of inadvertent spills or leaks that might pose a hazard to human health or the environment.

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[1] Risk Management Plan data obtained from USEPA's Envirofacts website at http://oaspub.epa.gov/ceppo.

8.12.6.1 Construction Phase

During facility construction, hazardous materials stored onsite will include small quantities of paints, thinners, solvents, cleaners, sealants, lubricants, and 5-gallon emergency fuel containers. This section describes measures that will be taken to mitigate potential risks from hazardous material usage. Paints, thinners, solvents, cleaners, sealants, and lubricants will be stored in a locked utility building. These materials will be handled per the manufacturers' directions and will be replenished as needed. The emergency fuel containers will be Department of Transportation (DOT)-approved, 5-gallon safety containers, secured to the construction equipment. The emergency fuel will be used only when regular vehicle fueling is unavailable.

Fuel, oil, and hydraulic fluids will be transferred directly from a service truck to construction equipment tanks and will not otherwise be stored onsite. Fueling will be performed by designated, trained service personnel either before or at the end of the workday. Service personnel will follow standard operating procedures (SOPs) for filling and servicing construction equipment and vehicles. The SOPs, which are designed to reduce the potential for incidents involving the hazardous materials, include the following:

- Refueling and maintenance of vehicles and equipment will occur only in designated areas that are equipped with spill control features (e.g., berms, paved surfaces, spill response kits, etc.).
- Vehicle and equipment service and maintenance will be conducted by authorized personnel only.
- Refueling will be conducted only with approved pumps, hoses, and nozzles.
- Catch-pans will be placed under equipment to catch potential spills during servicing.
- All disconnected hoses will be placed in containers to collect residual fuel from the hose.
- Vehicle engines will be shutdown during refueling.
- No smoking, open flames, or welding will be allowed in refueling or service areas.
- Refueling will be performed away from bodies of water to prevent contamination of water in the event of a leak or spill.
- When refueling is completed, the service truck will leave the project site.
- Service trucks will be provided with fire extinguishers and spill containment equipment, such as absorbents.
- Should a spill contaminate soil, the soil will be put in containers for offsite disposal as a hazardous waste.
- All maintenance and refueling areas will be inspected monthly. Results of inspections will be recorded in a logbook that will be maintained onsite.

Small spills will be contained and cleaned up immediately by trained, onsite personnel. Larger spills will be reported via emergency phone numbers to obtain help from offsite containment and cleanup crews. All personnel working on the project during the construction phase will be trained in handling hazardous materials and the dangers associated with hazardous materials. An onsite health and safety person will be designated to implement health and safety guidelines and contact emergency response personnel and the local hospital, if necessary.

If a spill involves hazardous materials equal to or greater than the specific reportable quantity all federal, state, and local reporting requirements will be followed. The California Water Code (Section 13272(f)) establishes a reportable quantity of 42 gallons for spills of petroleum products in water bodies. However, the California Water Quality Control Board Region 5 has jurisdiction for the project site and they would like all oil spills on surface water to be reported. In the event of a fire or injury, the local fire department will be called (Alameda County Fire Station No. 8).

8.12.6.2 Operation Phase

During EAEC operation, some hazardous and acutely hazardous materials will be stored onsite. Listed below are management and mitigation measures for minimizing the risks of hazardous material handling during facility operation.

Anhydrous Ammonia. The anhydrous ammonia storage and handling facilities will be equipped with continuous tank level monitors, temperature and pressure monitors and alarms, and excess flow and emergency block valves. Containment will be provided. If there is an inadvertent release from the storage tank, the liquid will be contained within the secondary containment structure. Vapor detection equipment will be installed to detect escaping ammonia and activate alarms and the automatic vapor suppression features.

Cyclohexylamine. Cyclohexylamine in the form of neutralizing amines will be fed into the condenser hotwell or condensate piping to control corrosion. The feed equipment will consist of a storage tank, pumps, leak detection system, alarm system, and fire detection and protection system. The chemical will be stored in 200- to 400-gallon totes located in the Water Treatment Facility. The totes will be located above concrete, epoxy-lined containment areas with sufficient capacity to contain the full quantity of a tank in the event of a spill or tank rupture.

Hazardous Materials. Sulfuric acid will be fed into the circulating water system in proportion to makeup water flow for alkalinity reduction; this will be done to control the scaling tendency of the circulating water within an acceptable range. The acid feed equipment will consist of an acid storage tank, chemical metering pumps, a leak detection system, and an alarm system. Two 8,000-gallon storage tanks will be located near the cooling tower circulating water pumps above a concrete epoxy-lined containment area; the area will have sufficient capacity to contain the 8,000 gallons (as single tank) of sulfuric acid plus accumulated rainfall for 24 hours during a 25-year storm.

Of the other hazardous materials that are continuously onsite, two merit additional discussion because of the quantity of material stored. Sodium hypochlorite will be added to the circulating water as a biocide. The system will consist of an 8,000-gallon storage tank, chemical metering pumps, a leak detection system, an alarm system, and a fire detection and protection system. Sodium hydroxide will be used primarily to remove hardness in the reactor/clarifier softener. The system will consist of an 8,000-gallon storage tank, chemical metering pumps, and a leak detection and alarm system. Both tanks will be located above concrete containment areas with sufficient capacity to contain the full tank contents plus accumulated rainfall for 24 hours during a 25-year storm.

All hazardous materials will be handled and stored in accordance with applicable codes and regulations. All containers used to store hazardous materials will be inspected at least daily for signs of leaking or failure. Incompatible materials will be stored in separate storage and containment areas. Areas susceptible to potential leaks and/or spills will be paved and bermed. Containment areas may drain to a collection area, such as an oil/water separator or a waste collection tank. Piping and tanks will be protected from potential traffic hazards by concrete or pipe-type traffic bollards and barriers.

If a spill involves hazardous materials equal to or greater than the specific reportable quantity all federal, state, and local reporting requirements will be followed. The California Water Code (Section 13272(f)) establishes a reportable quantity of 42 gallons for spills of petroleum products in water bodies. However, the California Water Quality Control Board Region 5 has jurisdiction for the project site and they would like all oil spills on surface water to be reported.

A worker safety plan, in compliance with applicable regulations, will be implemented. It will include training for contractors and operations personnel. Training programs will include safe operating procedures, the operation and maintenance of hazardous materials systems, proper use of PPE, fire safety, and emergency communication and response procedures. All plant personnel will be trained in emergency procedures, including plant evacuation and fire prevention. In addition, designated personnel will be trained as members of a plant hazardous material response team; team members will receive the first responder and hazardous material technical training to be developed in the HMBP (Section 8.12.6.4). However, in the event of an emergency, plant personnel will defer to Alameda County Fire Station No. 8 (1617 College Avenue, Livermore) or the Alameda County HazMat Support Unit at Fire Station No. 4 (20336 San Miguel Avenue, Castro Valley). For large spills, cities and counties provide mutual assistance. Fire stations in San Joaquin County and Contra Costa County will be the backup responders.

8.12.6.3 Transportation/Delivery of Hazardous Materials

Hazardous and acutely hazardous materials will be delivered periodically to EAEC. Transportation will comply with the applicable regulations for transporting hazardous materials, including DOT, U.S. Environmental Protection Agency (USEPA), California Department of Toxic Substances Control (DTSC), CHP, and California State Fire Marshal. Under the California Vehicle Code, the CHP has the authority to adopt regulations for transporting hazardous materials in California. The CHP can issue permits and specify the route for hazardous material delivery. The key acutely hazardous material that will be delivered to EAEC is the anhydrous ammonia, and the Vehicle Code has special regulations for the transportation of hazardous materials that pose an inhalation hazard (Vehicle Code Section 32100.5). These and other regulations concerning any of the other hazardous materials delivered to EAEC will be fully complied with.

8.12.6.4 Hazardous Materials Plans

Hazardous materials handling and storage, and training in the handling of hazardous materials will be set forth in more detail in hazardous materials plans that will be developed by the applicant.

Hazardous Materials Business Plan. A Hazardous Materials Business Plan (HMBP) is required by the California Code of Regulations (CCR) Title 19 and the Health and Safety Code (Section 25504). The plan will include an inventory and location map of hazardous materials onsite and an emergency response plan for hazardous materials incidents. The topics to be covered in the plan are:

- Facility identification
- Emergency contacts
- Inventory information (for every hazardous material)
- Material Safety Data Sheets (MSDS) for every hazardous material
- Site map
- Emergency notification data
- Procedures to control actual or threatened releases
- Emergency response procedures
- Training procedures
- Certification

The HMBP will be filed with Alameda County, the designated CUPA for the project site.

Risk Management Plan/Process Safety Management Plan. A Risk Management Plan (RMP) is required for substances listed in 40 CFR Section 68.130 that exceed designated threshold levels. Because an acutely hazardous material will be stored and used at EAEC, an RMP will be required, in addition to an HMBP. The requirements for an RMP are found in 40 CFR 68 Subpart G and under California's Accidental Release Prevention Program (CalARP) pursuant to Health and Safety Code Sections 25331 through 25543.3. The California program is similar to the federal program but may be more stringent in some areas. There are three programs under 40 CFR 68 and the RMP requirements that increase in stringency from Program 1 to Program 3. Program 1 applies to facilities where, under a worst-case release assessment, the distance to any public receptor cannot fall within the toxic endpoint release concentration for ammonia of 0.14 mg/L of air. This is about 200 ppm at standard conditions for temperature and pressure. Program 3 applies where a chemical is stored at or above its threshold quantity (TQ). Program 2 is for facilities that do not fit into Programs 1 or 3. The TQ for anhydrous ammonia is 10,000 pounds, so a Program 3 RMP will be prepared for EAEC.

The RMP will be filed with Alameda County, the designated CUPA for the project site. The RMP will cover acutely hazardous materials that can produce toxic clouds when inadvertently released. The RMP will include a hazard assessment to evaluate the potential effects of accidental releases; a program for preventing accidental releases; and a program for responding to accidental releases to protect human health and the environment.

The basic elements of an RMP are:

- Description of the facility
- Accident history of the facility
- History of equipment used at the facility
- Design and operation of the facility
- Site map(s) of the facility
- Piping and instrument diagrams of the facility

- Seismic analysis
- Hazard and operability study
- Prevention program
- Consequence analysis
- Offsite consequence analysis
- Emergency response
- Auditing and inspection
- Recordkeeping
- Training
- Certification

A Process Safety Management Plan (PSM) will be required under OSHA because the OSHA regulations require PSM for storage of anhydrous ammonia at quantities above 10,000 pounds. The requirements for a PSM are very similar to those for an RMP, but an offsite consequences analysis is not required for the PSM.

Spill Prevention Control and Countermeasure Plan. Federal and California regulations require a Spill Prevention Control and Countermeasures (SPCC) Plan if petroleum products above certain quantities are stored in aboveground storage tanks (AST). Both federal and state laws apply only to petroleum products that might be discharged to navigable waters. If stored quantities are equal to or greater than 660 gallons for a single tank, or equal to or greater than 1,320 gallons total, an SPCC Plan must be prepared. The key elements of an SPCC Plan are:

- Name, location, and telephone number of the facility
- Spill record of the facility and lessons learned
- Analysis of the facility, including:
  - Description of the facilities and engineering calculations
  - Map of the site
  - Storage tanks and containment areas
  - Fuel transfer and storage and facility drainage
  - Prediction and prevention of potential spills
- Spill response procedures
- Agency notification
- Personnel training and spill prevention

EAEC will store up to 30,000 gallons of turbine lubrication oil onsite. The nearest waterway is the Delta-Mendota Canal, which is approximately 2,000 feet from the project site. The Canal eventually empties into the Mendota Pool, at the junction of the San Joaquin River and the Kings River. Therefore, the EAEC will prepare an SPCC Plan, if the Regional Water Quality Control Board determines that a Plan is necessary.

8.12.6.5 Monitoring

An extensive monitoring program will not be required, because environmental effects during the construction and operation phases of the facility are expected to be minimal. However, sufficient monitoring will be performed during both of these phases to ensure that the proposed mitigation measures are complied with and that they are effective in mitigating any potential environmental effects.

8.12.7 Laws, Ordinances, Regulations, and Standards

The storage and use of hazardous materials and acutely hazardous materials at EAEC are governed by federal, state, and local laws. Applicable laws and regulations address the use and storage of hazardous materials to protect the environment from contamination and facility workers and the surrounding community from exposure to hazardous and acutely hazardous materials. The applicable LORS are summarized in Table 8.12-6.

TABLE 8.12-6
Applicable Laws, Ordinances, Regulations, and Standards

LOR	Applicability	Conformance (Section No.)
Federal:		
CERCLA/SARA		
Section 302	Requires certain planning activities when EHS are present in excess of TPQ. EAEC will have ammonia and sulfuric acid in excess of the TPQ.	An RMP will be prepared to describe planning activities. (Section 8.12.6.4).
Section 304	Requires notification when there is a release of hazardous material in excess of its RQ.	An HMBP will be prepared to describe notification and reporting procedures (Section 8.12.6.4).
Section 311	Requires MSDS for every hazardous material to be kept onsite and submitted to SERC, LEPC, and the local fire department.	The HMBP to be prepared will include MSDSs and procedures for submission to agencies (Section 8.12.6.4).
Section 313	Requires annual reporting of releases of hazardous materials.	The HMBP to be prepared will describe reporting procedures (Section 8.12.6.4).
Clean Air Act (CAA)	Requires an RMP if listed hazardous materials are stored at or above a TQ.	An RMP will be prepared (Section 8.12.6.4).
Clean Water Act (CWA)	Requires preparation of an SPCC plan if oil is stored above certain quantities.	An SPCC will be prepared (Section 8.12.6.4).
California:		
Health and Safety Code, Section 25500, et seq. (Waters Bill)	Requires preparation of an HMBP if hazardous materials are handled or stored in excess of threshold quantities.	An HMBP will be prepared (Section 8.12.6.4).
CalARP Program. Health and Safety Code, Section 25531 through 25543.4 (La Follette Bill)	Requires registration with local CUPA or lead agency and preparation of an RMP if acutely hazardous materials are handled or stored in excess of TPQs.	An RMP will be prepared that will describe procedures for registration with Alameda County CUPA (Section 8.12.6.4).
Aboveground Petroleum Storage Act	Requires entities that store petroleum in ASTs in excess of certain quantities to prepare an SPCC Plan.	An SPCC Plan will be prepared (Section 8.12.6.4).
Safe Drinking Water and Toxics Enforcement Act (Proposition 65)	Requires warning to persons exposed to a list of carcinogenic and reproductive toxins and protection of drinking water from same toxins.	The site will be appropriately labeled for chemicals on the Proposition 65 list.
Local:		
Alameda County Fire Code, as amended	Requires proper storage and handling of hazardous materials	See Section 8.12.6.

EHS = Extremely hazardous substance.
SERC = Stage emergency response committee
LEPC = Local emergency planning committee.

8.12.7.1 Federal

Hazardous materials are governed under CERCLA, the CAA, and the CWA.

CERCLA. SARA, an amendment to CERCLA, governs hazardous materials. The applicable part of SARA for EAEC is Title III, otherwise known as the Emergency Planning and Community Right-To-Know Act of 1986 (EPCRA). Title III requires states to establish a process for developing local chemical emergency preparedness programs and to receive and disseminate information on hazardous materials present at facilities in local communities. The law provides primarily for planning, reporting, and notification concerning hazardous materials. Key sections of the law are:

- Section 302—requires that certain emergency planning activities be conducted when EHSs are present in excess of their TPQs. EHSs and their TPQs are found in Appendices A and B to 40 CFR Part 355.
- Section 304—Requires immediate notification to the LEPC and the SERC when a hazardous material is released in excess of its RQ. If a CERCLA-listed hazardous substance RQ is released, notification must also be given to the National Response Center in Washington, D.C. (RQs are listed in 40 CFR Part 302, Table 302.4). These notifications are in addition to notifications given to the local emergency response team or fire personnel.
- Section 311—Requires that either MSDSs for all hazardous materials or a list of all hazardous materials be submitted to the SERC, LEPC, and local fire department.
- Section 313—Requires annual reporting of hazardous materials released into the environment either routinely or as a result of an accident.

CAA. Regulations (40 CFR 68) under the CAA are designed to prevent accidental releases of hazardous materials. The regulations require facilities to develop an RMP, if they store designated materials above threshold quantities. The RMPs must include hazard assessments and response programs to prevent accidental releases of certain chemicals. Section 112(r)(5) of the CAA discusses the regulated chemicals. These chemicals are listed in 40 CFR 68.130. Anhydrous ammonia (in concentrations greater than or equal to 20 percent) is a listed substance with a threshold quantity of 10,000 pounds.

CWA. The SPCC program under the CWA is designed to prevent or contain the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Regulations under the CWA (40 CFR 112) require facilities to prepare a written SPCC Plan if they store oil and its release would pose a threat to navigable waters. The SPCC program is applicable if a facility has a single oil AST with a capacity greater than 660 gallons, total AST storage greater than 1,320 gallons, or underground storage capacity greater than 42,000 gallons.

Other related federal laws that address hazardous materials but do not specifically address their handling, are the Resource Conservation and Recovery Act (RCRA), which is discussed in Section 8.13, and the OSHA, which is discussed in Section 8.7.

8.12.7.2 State

California laws and regulations relevant to hazardous materials handling at EAEC include Health and Safety Code Section 25500 (hazardous materials), Health and Safety Code

Section 25531 (acutely hazardous materials), and the Aboveground Petroleum Storage Act (petroleum in aboveground tanks).

Health and Safety Code Section 25500 (Waters Bill). This law is found in the California Health and Safety Code, Section 25500, et seq., and in the regulations contained in 19 CCR Section 2620, et seq. The law requires local governments to regulate local business storage of hazardous materials in excess of certain quantities. The law also requires that entities storing hazardous materials be prepared to respond to releases. Those using and storing hazardous materials are required to submit an HMBP to their local administering agency (i.e. CUPA). They must also report releases to their CUPA and the Governor's Office of Emergency Services. The threshold quantities for hazardous materials are 55 gallons for liquids, 500 pounds for solids, and 200 cubic feet for compressed gases measured at standard temperature and pressure.

Health and Safety Code Section 25531 (La Follette Bill). This law regulates the registration and handling of acutely hazardous materials, per California Health and Safety Code, Section 25531, et. seq. Acutely hazardous materials are any chemicals designated as an extremely hazardous substance by the USEPA as part of its implementation of SARA Title III. The La Follette Bill expands the programs mandated by the Waters Bill and overlaps or duplicates some of the requirements of SARA and the CAA. Facilities handling or storing acutely hazardous materials at or above threshold planning quantities must register with their local CUPA and prepare an RMP. The TPQ for ammonia is 500 pounds.

Aboveground Petroleum Storage Act. This law is found in the Health and Safety Code at Sections 25270 to 25270.13 and is intended to ensure compliance with the federal CWA. The law applies if a facility has an AST with a capacity greater than 660 gallons or a combined AST capacity greater than 1,320 gallons and if there is a reasonable possibility that the tank(s) may discharge oil in "harmful quantities" into navigable waters or adjoining shore lands. If a facility falls under these criteria, it must prepare an SPCC. The law does not cover AST design, engineering, construction, or other technical requirements, which are usually determined by local fire departments.

Safe Drinking Water and Toxics Enforcement Act (Proposition 65). This law identifies chemicals that cause cancer and reproductive toxicity, informs the public, and prevents discharge of the chemicals into sources of drinking water. Lists of the chemicals of concern are published and updated periodically. The Act is administered by California's Office of Environmental Health Hazard Assessment. Some of the chemicals to be used at EAEC are on the cancer-causing and reproductive-toxicity lists of the Act.

8.12.7.3 Local

Local agencies usually have the responsibility for administering hazardous materials requirements and ensuring compliance with federal and state laws. The Alameda County Fire Department and the Alameda County Department of Environmental Health are the local agencies with jurisdiction over hazardous materials storage and handling practices. The local requirements that pertain to hazardous materials are discussed below.

Alameda County. The ordinance regulating hazardous materials storage is the Uniform Fire Code, as amended by the Alameda County Fire Code. Alameda County is the designated CUPA for the project site and is responsible for administering RMPs filed by businesses located in the county. The County is also the regulatory body for all hazardous waste generated in the County (see Section 8.13, Waste Management).

8.12.7.4 Codes

The design, engineering, and construction of hazardous materials storage and dispensing systems will be in accordance with all applicable codes and standards, including the following:

- California Vehicle Code, 13 CCR 1160, et seq.—Provides the CHP with authority to adopt regulations for the transportation of hazardous materials in California.
- The Uniform Fire Code, Article 80—The hazardous materials section of the Fire Code. Local fire agencies or departments enforce this code and can require that an HMBP and a Hazardous Materials Inventory Statement be prepared. This requirement and the Waters Bill requirement for an HMBP can usually be satisfied in a single combined document.
- State Building Standard Code, Health and Safety Code Sections 18901 to 18949—Incorporates the UBC, Uniform Fire Code, and Uniform Plumbing Code.
- The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section VIII.
- The American National Standards Institute (ANSI) K61.1.

8.12.8 Involved Agencies and Agency Contacts

Several agencies regulate hazardous materials, and they will be involved in regulating the hazardous materials stored and used at EAEC. At the federal level, the USEPA will be involved; at the state level, the California Environmental Protection Agency (CalEPA) will be involved. However, local agencies primarily enforce hazardous materials laws. For EAEC, the primary local agency with jurisdiction will be Alameda County. The persons to contact are listed in Table 8.12-7.

TABLE 8.12-7
Agency Contacts for EAEC Hazardous Materials Handling

Topic	Agency	Address	Contact	Title	Telephone
Hazardous Materials Business Plan and Risk Management Plan	Alameda County Environmental Health Department	1131 Harbor Bay Parkway, Alameda, CA 94502-6577	Rob Weston	Senior Hazardous Materials Specialist	510/567-6700
Fire Dept. Permits	Alameda County Fire Department	835 East 14th St., Suite 200, San Leandro, CA 94579	Bob Bowman	Deputy Fire Marshal	510/670-5853
Hazardous Materials Response	Alameda County Fire Department, HazMat Support Unit	835 East 14th St., Suite 200, San Leandro, CA 94579	Jody Naaf, Stan Silva, or Vince Davis, depending on shift	Battalion Chief	510/670-5884

8.12.9 Permits Required and Permit Schedule

Alameda County requires the following permits listed in Table 8.12-8.

TABLE 8.12-8
Permits Required and Permit Schedule for EAEC Hazardous Material Handling

Permit	Applicability	Schedule for Permit
Hazardous Materials Storage Permit	Requires that businesses obtain permits for hazardous materials storage.	Prior to storage of hazardous materials at the site.
Flammable or Combustible Liquids Storage Permit	Alameda County Fire Code requires that businesses obtain permits for the use and storage of flammable and combustible liquids.	Prior to storage of flammable or combustible liquids at the site.
Compressed Gases Permit	Alameda County Fire Code requires that businesses obtain permits for the use and storage of compressed gases.	Prior to the storage of compressed gases at the site.
Welding Operations Permit	Alameda County Fire Code requires that businesses obtain permits for permanent welding operations.	Prior to the commencement of any permanent welding operations at the site.

8.12.10 References

Bowman, B. 2000. Telephone conversation with Bob Bowman, Deputy Fire Marshal, Alameda County Fire Department, November 9.

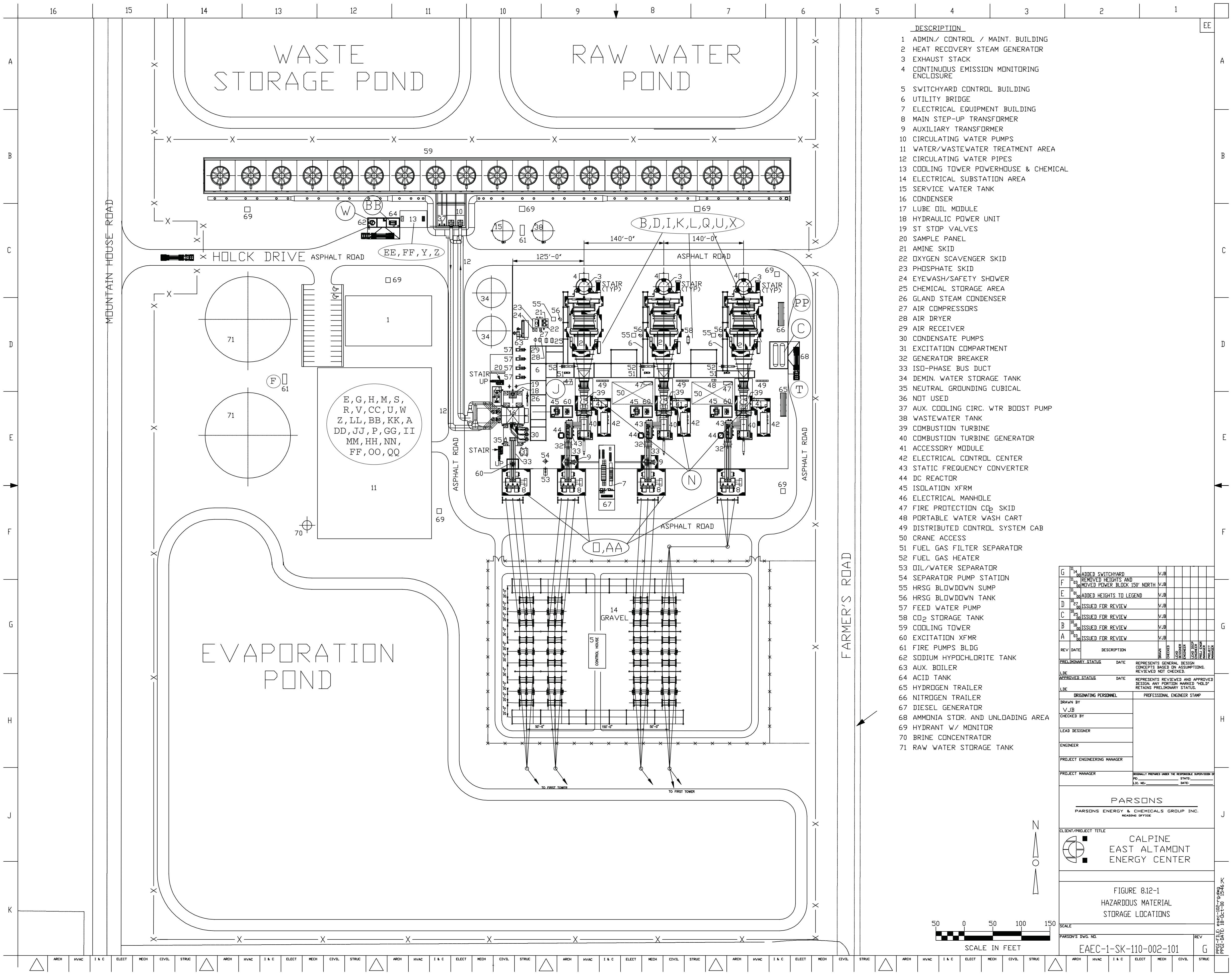
Ericson, J. 2000. Telephone conversation with John Ericson, Central Valley Water Quality Control Board Region 5. November 15.

Hiett, R. 2000. Telephone conversation with Richard Hiett, San Francisco Bay Water Quality Control Board Region 2. October 18.

Weston, R. 2000. Telephone conversation with Ron Weston, Senior Hazardous Materials Specialist, Alameda County. October 24.

U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health. 1990. *NIOSH Pocket Guide to Chemical Hazards*

(A) ALUMINUM SULFATE, SODIUM ALUMINATE, OR POLYALUMINUM CHLORIDE
(B) AMMONIUM BIFLUORIDE
(C) AMMONIA
(D) CITRIC ACID
(E) CLEANING CHEMICALS/DETERGENTS
(F) DIESEL NO. 2
(G) DISODIUM PHOSPHATE
(H) OXYGEN SCAVENGER
(I) FORMIC ACID
(J) HYDRAULIC OIL
(K) HYDROCHLORIC ACID
(L) HYDROXYACETIC ACID
(M) LABORATORY REAGENTS
(N) LUBRICATING OIL
(O) MINERAL INSULATING OIL
(P) CHELATING AGENTS
(Q) NEUTRALIZING AMINES
(R) ANTIFOAM
(S) SODIUM SULFATE
(T) SODIUM NITRITE
(U) SODIUM CARBONATE
(V) SODIUM HYDROXIDE
(W) SODIUM HYPOCHLORITE
(X) SODIUM NITRATE
(Y) SCALE INHIBITOR (POLYACRYLATE)
(Z) STABILIZED BROMINE (BIOCIDE)
(AA) SULFER HEXAFLUORIDE
(BB) SULFURIC ACID
(CC) TRISODIUM PHOSPHATE
(DD) SODIUM HEXAMETA PHOSPHATE
(EE) NON-OXIDIZING BIOCIDE
(FF) SODIUM BROMIDE
(GG) FERRIC CHLORIDE OR FERRIC SULFATE
(HH) COAGULANT AID POLYMER
(II) CALCIUM OXIDE OR CALCIUM HYDROXIDE
(JJ) MAGNESIUM OXIDE OR MAGNESIUM HYDROXIDE
(KK) SODIUM BISULFITE OR SODIUM SULFITE
(LL) PHOSPHONATE
(MM) FILTER AID POLYMER
(NN) CALCIUM CHLORIDE
(OO) CALCIUM SULFATE
(PP) HYDROGEN
(QQ) ANTIFREEZE



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8.13 Waste Management

This section evaluates the potential effects on human health and the environment from nonhazardous and hazardous waste generated at EAEC.

Section 8.13.1 describes the current condition of the proposed site, and Section 8.13.2 describes the waste and waste streams that are expected to be generated by the project. Section 8.13.3 describes waste disposal sites for nonhazardous and hazardous waste, and Section 8.13.4 describes methods that will be employed to manage the generated waste and mitigate its impacts on the environment. Section 8.13.5 discusses cumulative impacts, and Section 8.13.6 describes waste monitoring. Section 8.13.7 presents LORS that apply to the generated waste; Section 8.13.8 describes agencies that have jurisdiction over the generated waste and persons to contact in those agencies. Section 8.13.9 describes permits required for waste generated and a schedule for obtaining those permits. Section 8.13.10 provides the references used to prepare this section.

8.13.1 Environmental Condition of Site

The site is currently zoned agricultural and is being farmed. A Phase I Environmental Site Assessment (ESA) conducted in accordance with the ASTM Standard E 1527, Standard Practice for Environmental Site Assessments, revealed the following environmental conditions resulting from present or past activities (CH2M HILL, 2000). A copy of the ESA is contained in Appendix 8.13.A.

8.13.1.1 Historical Uses and Surrounding Areas

A private citizen has been farming the land since approximately 1950 and living in a residence located at the southwest corner of the property. Typical crops have included wheat, alfalfa, oats, beans, and sugar beets. The surrounding area is used for agriculture and large infrastructure projects. These projects include the Western Area Power Authority's Tracy substation; two pumping stations for the Delta-Mendota Canal and the California Aqueduct; PG&E's gas compressor station; numerous windfarms; four 500-kV transmission lines; four 230-kV transmission lines; and several lower voltage lines. (CH2M HILL, 2000)

8.13.1.2 Site Inspection

The following were observed during the site inspection:

- The residence and barn at the southwest corner of the property contained typical farm equipment and chemicals.
- Pesticide containers were present in the former chicken coop. It is not known if releases of hazardous substances are present in the vicinity of the chicken coop.
- Releases of petroleum and lubricant products in the main yard equipment staging areas, near the lubricant dispensing stand and forklift parking area, and near the aboveground waste oil storage tanks.
- An underground storage tank was removed from the site approximately 10 years ago. No documentation is available regarding the removal of the tank, the condition of the

tank at the time of removal, or the potential presence of petroleum products or hazardous substances associated with gasoline (CH2M HILL, 2000).

8.13.1.3 Database Review

Records that included the area within a 1.0-mile radius around the project area indicated that surrounding sites should not pose environmental concerns for the site, but there have been releases to the groundwater. The Shell Oil Company – Schropp Farms site is located approximately 0.30 mile south of the project area. Gasoline was released at this site and monitoring activities are being conducted following remedial actions at the site. The Tracy Pumping Plant Substation site, which is located approximately **0.35 mile** west of the project area, experienced a release of solvents and remediation is in progress. A site within the Tracy Pumping Plant Substation is located approximately **0.67 mile** west of the project area. Gasoline was released at this site, which resulted in soil and groundwater contamination. Contaminated soil was removed and groundwater monitoring was conducted. Migration of petroleum hydrocarbons in the groundwater at the site was limited to an area within 20 feet of the release.

8.13.2 Project Waste Generation

Wastewater, solid nonhazardous waste, and liquid and solid hazardous waste will be generated at the EAEC site during facility construction and operation. Solid nonhazardous waste will also be generated during the construction of the electric transmission line, the natural gas supply line, and waterlines.

8.13.2.1 Pre-Construction Phase

The site is currently used for farming. It will be necessary to remove small amounts of vegetation, irrigation piping, and various abandoned farming implements prior to EAEC construction.

Nonhazardous Solid Waste. The nonhazardous solid waste remaining onsite will be removed and disposed of by a waste removal company. The portion of the waste that is recyclable will be recovered and the remaining waste deposited in a Class III landfill. The quantity of this waste is currently unknown.

Nonhazardous Wastewater. Nonhazardous water found on the site or produced in the clean-up process will be collected in a drum or container and will be taken offsite for disposal.

Hazardous Waste. If hazardous waste such as oils, pesticides, and herbicides are discovered during construction, it will be removed by a certified hazardous waste collection company and either recycled or deposited in a Class I landfill in full compliance with all applicable LORS.

8.13.2.2 Construction Phase

During construction, the primary waste generated will be solid nonhazardous waste. However, some nonhazardous liquid waste and hazardous waste (solid and liquid) will also be generated. Most of the hazardous wastes will be generated at the plant site, but a minimal quantity of hazardous waste will be generated during construction of the electric transmission line, natural gas supply line, and water supply and wastewater discharge lines. The types of waste and their estimated quantities are described below.

Nonhazardous Solid Waste. Listed below are nonhazardous waste streams that could potentially be generated from construction of the generating facility, the electric transmission line, the natural gas supply line, and the water supply line.

Paper, Wood, Glass, and Plastics. Paper, wood, glass, and plastics will be generated from packing materials, waste lumber, insulation, and empty nonhazardous chemical containers. Approximately 100 tons of these wastes will be generated during project construction. These wastes will be recycled where practical. Waste that cannot be recycled will be disposed of weekly in a Class III landfill. Onsite, the waste will be placed in dumpsters.

Concrete. Approximately 70 tons of excess concrete will be generated during construction. Waste concrete will be disposed of weekly in a Class III landfill or at clean fill sites, if available.

Metal. Metal will include steel from welding/cutting operations, packing materials, and empty nonhazardous chemical containers. Aluminum waste will be generated from packing materials and electrical wiring. Approximately 25 tons of metal will be generated during construction. Waste will be recycled where practical, and nonrecyclable waste will be deposited in a Class III landfill.

Drilling Mud. Some drilling could be required to install natural gas and water pipelines. Drilling mud, consisting of nontoxic bentonite clay, will be used to lubricate and cool the drilling bit. Approximately 300 barrels could be used in the drilling and will require disposal at a Class II or III landfill.

Nonhazardous Wastewater. Nonhazardous wastewater will be generated, including sanitary wastewater, equipment washwater, stormwater runoff, wastewater from pressure testing the gas supply line, and water from excavation dewatering. Sanitary waste will be collected in portable, self-contained toilets. Equipment washwater will be contained at specifically designated wash areas and disposed of offsite. Stormwater runoff will be managed in accordance with the contractor-developed stormwater pollution prevention plan that will be approved by the appropriate agencies prior to the start of construction.

The gas supply pipeline hydrostatic test water will be filtered to collect any sediment and welding fragments. The water will be collected, tested, and disposed of by the pipeline contractor. Water from construction dewatering will be discharged to onsite evaporation ponds.

Hazardous Waste. Most of the hazardous waste generated during construction will consist of liquid waste, such as flushing and cleaning fluids, passivating fluid (to prepare pipes for use), and solvents. Some hazardous solid waste, such as welding materials and dried paint, may also be generated.

Flushing and cleaning waste liquid will be generated when pipes and boilers are cleaned and flushed. Passivating fluid waste is generated when high temperature pipes are treated with either a phosphate or nitrate solution. The volume of flushing and cleaning and passivating liquid waste generated is estimated to be one to two times the internal volume of the pipes cleaned. The quantity of welding, solvent, and paint waste is expected to be minimal.

The construction contractor will be considered the generator of hazardous construction waste and will be responsible for proper handling of hazardous waste in compliance with all applicable federal, state, and local laws and regulations, including licensing, personnel training, accumulation limits and times, and reporting and recordkeeping. The hazardous waste will be collected in satellite accumulation containers near the points of generation. It will be moved daily to the contractor's 90-day hazardous waste storage area, located at the site construction laydown area. The waste will be removed from the site by a certified hazardous waste collection company and delivered to an authorized hazardous waste management facility, prior to expiration of the 90-day storage limit.

8.13.2.3 Operation Phase

During EAEC facility operation, the primary waste generated will be nonhazardous wastewater. However, nonhazardous solid waste and varying quantities of both solid and liquid hazardous waste will also be generated periodically. The types of waste and their estimated quantities are discussed below.

Nonhazardous Solid Waste. The EAEC facility will produce maintenance and generating facility wastes, typical of power generation operations. These will include rags, turbine air filters, broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, the typical refuse generated by workers and small office operations, and other miscellaneous solid wastes. The quantity generated is estimated to be about 70 cubic yards per year. Large metal parts will be recycled.

Nonhazardous Wastewater. Water balance diagrams, provided in Figures 2.2-6a through 2.2-6f, illustrate the expected waste streams and flow rates for the EAEC generating facility. There will be two separate wastewater collection systems. The first and primary system will collect wastewater from all of the facility equipment, including the HRSGs, cooling towers, and water treatment equipment. The facility will be designed for zero discharge of industrial wastewater. Wastewater from the primary collection system will be processed through a brine concentrator. The concentrated brine will be discharged to onsite evaporation ponds while the recovered water will be reused as makeup water for the mixed-bed demineralizer. The second wastewater collection system will collect sanitary wastewater from sinks, toilets, and other sanitary facilities to be discharged to an onsite septic tank and leach field.

A description of the primary wastewater sources is provided below.

Circulating Water System Blowdown. Circulating water system blowdown will consist of raw and/or recycled water that has been concentrated in the cooling tower. Raw water will be obtained from the BBID, supplemented by recycled water from the MHCSD WWTP when it becomes available. Chemicals will be added to the raw water to control scaling and biofouling of the cooling tower, as well as corrosion of the circulating water piping and condenser. This treated water will then be circulated through the condenser and cooling tower. Cooling tower blowdown will be discharged to a zero discharge treatment system; the majority of the water will be reclaimed for reuse within the plant. Sludge from the evaporation ponds will be tested to characterize it as hazardous or nonhazardous waste, and it will be disposed of accordingly. If hazardous, it will be removed from the site by a certified hazardous waste collection company and disposed of offsite at a Class I landfill; if nonhazardous, it will be disposed of offsite at a Class III landfill.

Zero Discharge Treatment System. Cooling tower blowdown will first pass through a reactor/clarifier. The reactor/clarifier will be a solids contact clarifier where sodium hydroxide (caustic) will be fed to the influent stream to precipitate calcium carbonate and reduce silica and magnesium concentrations. In addition to the sodium hydroxide, soda ash will be added to assist in the control of calcium, magnesium oxide will be added to assist in the removal of silica, and coagulants and polymer will be added to aid in the coagulation and sedimentation of suspended solids. The majority of the sludge produced by the process will be re-circulated within the clarifier. The remaining sludge will be discharged to a sludge thickener followed by a filter press, producing a relatively dry filter cake suitable for landfill disposal. Supernatant from the sludge thickener will be returned to the influent of the reactor/clarifier. The reactor/clarifier effluent will next pass through sidestream filters to reduce suspended solids. The sidestream filters will consist of multimedia (sand/anthracite) filters with intermittent air/water backwash. The backwash wastewater will be discharged to an equalization basin, from which it will slowly be fed to the sludge thickener. The filtered water will be collected in a storage tank, providing a source of water for backwashing the filters. Filtered water will next pass through a high TDS reverse osmosis (RO) system to remove the majority of the dissolved solids. The RO permeate will be recovered and used for cooling tower makeup. The RO reject stream will be concentrated in a vapor compression evaporator (brine concentrator). The brine concentrator high-purity distillate will be stored in a distillate storage tank where it will then be used as makeup for the demineralized water system. Excess distillate will overflow the storage tank and be recycled to the cooling tower basin. The concentrated brine solution, which represents the only process waste stream not reclaimed for reuse, will be discharged to the evaporation ponds. Two evaporation ponds, approximately 5 acres each, will be provided.

Plant Drains-Oil/Water Separator. General facility drainage will consist of area washdown, sample drains, equipment leakage, and drainage from facility equipment areas. Water from these areas will be collected in a system of floor drains, hub drains, sumps, and piping and routed to the facility wastewater collection system. Drains that could contain oil or grease will first be routed through an oil/water separator. Water from the plant wastewater collection system will be recycled to the cooling tower basin. Wastewater from combustion turbine water washes will be collected in a holding tank. If cleaning chemicals were not used during the water wash procedure, the wastewater will be discharged to the oil/water separator. Wastewater containing cleaning chemicals will be trucked offsite for disposal at an approved wastewater disposal facility.

Power Cycle Makeup Treatment Wastes. Wastewater from the power cycle makeup water treatment system will consist of the reject stream from the makeup RO units and backwash water from the multi-media filters upstream of the RO units. The RO units will reduce the concentration of dissolved solids in the plant makeup water before it is treated in the mixed-bed ion exchange vessels. The RO reject stream will contain the constituents of the plant raw water, concentrated approximately five times; residues of chemicals, such as aluminum sulfate, ferric chloride, and polymer, added to the raw water to coagulate suspended solids prior to filtration; sodium bisulfite or sodium sulfite added to the RO feedwater to eliminate free chlorine that would otherwise damage the RO membranes; and phosphate to prevent scaling of the membranes. The filter backwash water will contain the suspended solids removed from the raw water and residues of the coagulants used to enhance filtration efficiency. These waste streams will be collected and recycled to the cooling tower basin along with the plant drains and permeate from the high-TDS RO units.

HRSG and Auxiliary Boiler Blowdown. HRSG blowdown will consist of boiler water discharged from the HRSG steam drums to control the concentration of dissolved solids and silica within acceptable ranges. Boiler blowdown will be discharged to flash tanks where the steam is vented to the atmosphere and the condensate is cooled by mixing it with a small amount of circulating water. The quenched condensate will be discharged to the cooling tower basin, thus reclaiming the majority of the boiler blowdown.

Hazardous Waste. Hazardous waste generated will include waste lubricating oil, used oil filters, spent SCR and oxidation catalysts, and chemical cleaning wastes. The catalyst units will contain heavy metals that are considered hazardous. Chemical cleaning wastes will be generated from the periodic cleaning of the HRSGs and associated piping. They will consist of alkaline and acidic cleaning solutions used during chemical cleaning of the HRSG boiler system turbine wash and HRSG fireside washwaters. These wastes generally contain high concentrations of heavy metals and will be collected for offsite disposal.

The chemical feed area drains will collect spillage, tank overflows, effluent from maintenance operations, and liquid from area washdowns. After neutralization, if required, water collected from the chemical storage areas will be directed to the cooling tower basin. The quantity of this effluent is expected to be minimal.

Wastes that will be generated at the facility are summarized in Table 8.13-1.

8.13.3 Waste Disposal Sites

Nonhazardous solid waste (often referred to as solid waste, municipal solid waste [MSW], or garbage) will be recycled or deposited in a Class III landfill. Nonhazardous liquid wastes will be processed onsite in the evaporation ponds. Hazardous wastes, both solid and liquid, will be delivered to a permitted offsite Treatment, Storage, and Disposal (TSD) facility for treatment or recycling or deposited in a permitted Class I landfill. The following subsections describe the waste disposal sites feasible for disposal of EAEC wastes.

8.13.3.1 Nonhazardous Waste

Livermore-Dublin Disposal, a subsidiary of Waste Management Inc., provides garbage collection services in the project site area, but they do not provide pickup services for recyclable materials. The Vasco Road Landfill and the Pleasanton Garbage Service Transfer Station have recycling bins where materials can be dropped off.

The landfill used by Livermore-Dublin Disposal is the Vasco Road Landfill in Livermore. Vasco Road Landfill has adequate capacity to handle and dispose of solid waste generated by the EAEC facility, as shown in Table 8.13-2. The most likely alternative to the Vasco Road Landfill is the Altamont Landfill and Resource Recovery Facility in Livermore. There are no open enforcement actions against either the Vasco Road or Altamont landfill and no violations have been issued to these facilities for the past 2 years (Moroz, 2000).

TABLE 8.13-1
Hazardous Wastes Generated at the EAEC Facility

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Lubricating oil	Small leaks and spills from the gas turbine lubricating oil system	Hydrocarbons	500 lb/yr	Hazardous	Cleaned up using sorbent and rags – disposed of by certified oil recycler
Lubricating oil filters	Gas turbine lubricating oil system	Paper, metal, and hydrocarbons	1,000 lb/yr	Hazardous	Recycled by certified oil recycler
Laboratory analysis waste	Water treatment	Sulfuric acid	500 gals/yr	Hazardous	Recycled by certified recycler
SCR catalyst units	SCR system (Warranty is 3 years-use tends to be 3 to 5 years)	Metal and heavy metals, including vanadium	1,000 lb every 3 to 5 yrs	Hazardous	Recycled by SCR manu-facturer or disposed of in Class I landfill
CO catalyst units	Auxiliary boiler (Use tends to be 3 to 5 years)	Metal and heavy metals, including vanadium	1,000 lb every 3 to 5 yrs	Hazardous	Recycled by manufacturer
Oily rags	Maintenance, wipe down of equipment, etc.	Hydrocarbons, cloth	300 lb/yr (~800 rags/yr)	Hazardous	Recycled by certified oil recycler
Oil sorbents	Cleanup of small spills	Hydrocarbons	200 lb/yr	Hazardous	Recycled or disposed of by certified oil recycler
Cooling tower sludge	Deposited in cooling tower basin by cooling water	Dirt from air, arsenic from water	200 lb/yr	Could be hazardous, but usually not	Class II landfill if nonhazardous; Class I if hazardous
Chemical feed area drainage	Spillage, tank overflow, area washdown water	Water with water treatment chemicals	Minimal	May be hazardous if corrosive	Onsite neutralization, if required, then discharged to cooling tower basin

TABLE 8.13-2
Solid Waste Disposal Facilities for EAEC Waste

Landfill/MRF/ Transfer Station	Location	Class	Permitted Capacity	Current Operating Capacity	Remaining Capacity	Estimated Closure Date	Comments
Vasco Road Landfill	Livermore	III	2,518 tons/day 31.9 million cubic yards	2,503 tons/day	10.9 million cubic yards	2015	No outstanding enforce-ment actions.
Altamont Landfill and Resource Recovery Facility	Livermore	II, III	11,150 tons/ day	6,000 tons/day	69.1 million cubic yards	2024	No outstanding enforce-ment actions. Permit expansion for 40 million tons was approved in March 2000.
Tri-Cities Recycling and Disposal Facility	Fremont	II, III	2,346 tons/day	2,100 tons/day	1.3 million cubic yards	2001	No outstanding enforce-ment actions.
Pleasanton Garbage Service Transfer Station	Pleasanton	III	720 tons/day	325 tons/day	N/A	N/A	No outstanding enforce-ment actions.

Data obtained from the California Integrated Waste Management Board Solid Waste Information System database and the Alameda County Waste Management Authority.

Other landfills in the area include the Tri-Cities Recycling and Disposal Facility in Fremont. Regional landfills and transfer stations are shown in Table 8.13-2. The alternative facilities are not currently used by Livermore-Dublin Disposal, but they could be in the future as the Vasco Road facility nears capacity. Disposal of solid nonhazardous waste will not be a constraint on EAEC development.

8.13.3.2 Hazardous Waste

Hazardous waste generated at EAEC will be stored at that facility for less than 90 days. The waste will then be transported by a permitted hazardous waste transporter to a TSD facility. These facilities vary considerably in what they can do with the hazardous waste they receive. Some can only store waste, some can treat the waste to recover usable products, and others can dispose of the waste by incineration, deep-well injection, or landfilling. (Incineration and deep-well injection are not permitted in California.)

According to the National Biennial RCRA Hazardous Waste Report (Based on 1997 Data), there were 250 RCRA TSD facilities in California (USEPA, 1999). Many of these facilities are companies such as oil refineries or military facilities that do not take hazardous waste from other generators. The closest commercial TSD facility is a Safety-Kleen branch office in Oakland. This facility recycles used oil and is permitted to store and transfer several hazardous wastes, including solvents, paint, and batteries. Wastes collected by the facility are shipped to other Safety-Kleen service centers for treatment or disposal. Other TSD facilities in the regional area include a Laidlaw branch office in Benicia, a Safety-Kleen branch office in San Jose, and a Safety-Kleen service center in San Jose. The Safety-Kleen service center in San Jose is a fully permitted TSD facility that accepts all hazardous wastes except radioactive and medical waste (Ichinaga, 2000). Safety-Kleen is now owned by Laidlaw, which has numerous TSD facilities in California.

For ultimate disposal, California has the following three hazardous waste (Class I) landfills.

Safety-Kleen's Buttonwillow Landfill in Kern County. This landfill is permitted at 13.25 million cubic yards and they have approximately 10.9 million cubic yards of remaining space, as of October 2000. The annual deposit rate is currently 130,000 to 150,000 cubic yards. At the current deposit rate, the landfill can accept hazardous waste until approximately 2068 to 2078. Buttonwillow has been permitted to accept all hazardous wastes except flammables, PCB with a concentration greater than 50 ppm, medical waste, explosives, and radioactive waste with radioactivity greater than 20,000 picocuries.

Safety-Kleen's Westmorland Landfill in Imperial County. This landfill is permitted at 4 million cubic yards and, to date, has approximately 2.4 million cubic yards of remaining space. The annual deposit rate is currently about 110,000 cubic yards; at the current deposit rate, the estimated closure date for the landfill is 2021. The landfill's conditional use permit (CUP) prohibits the acceptance of some types of waste, including radioactive (except geothermal) waste, flammables, biological hazard waste (medical), PCB, dioxins, air- and water-reactive wastes, and strong oxidizers.

Chemical Waste Management's Kettleman Hills Landfill in Kings County. This landfill has 6 to 7 million cubic yards of remaining permitted capacity for hazardous waste (Class I). They also accept Class II and Class III wastes. The current annual deposit rate is about 200,000 cubic yards per year. According to Chemical Waste, the landfill will be open for at least another 25 years, though they could permit additional capacity, if necessary. The Class I landfill is permitted for and will accept all hazardous wastes except radioactive, medical, and unexploded ordnance (UXO).

In addition to landfills, there are numerous offsite commercial hazardous waste treatment and recycling facilities in California. (For example, Safety-Kleen has 11 branch offices, two accumulation centers, two service centers, and one recycling center in California.) These facilities have sufficient capacity to recycle and/or treat hazardous waste generated in California. Most hazardous waste generated at the EAEC site will be generated from the flushing and cleaning of pipelines and the HRSG prior to facility startup. All hazardous waste will be removed and delivered to a TSD facility. Used oil will be collected by a permitted oil recycler.

8.13.4 Waste Management Methods and Mitigation

The handling and management of waste generated by EAEC will follow the hierarchical approach of source reduction, recycling, treatment, and disposal. The first priority will be to reduce the quantity of waste generated through pollution prevention methods (e.g., high-efficiency cleaning methods). The next level of waste management will involve the reuse or recycle of wastes (e.g., used oil recycling). For wastes that cannot be recycled, treatment will be used, if possible, to make the waste non-hazardous (e.g., neutralization). Finally, offsite disposal will be used to dispose of residual wastes that cannot be reused, recycled, or treated.

The following subsections present methods for managing both nonhazardous and hazardous waste generated by EAEC.

8.13.4.1 Construction Phase

Nonhazardous solid waste generated during construction will be collected in onsite dumpsters and picked up periodically by Livermore-Dublin Disposal. The waste will then be taken to the Vasco Road Landfill or another county landfill. Recyclable materials can be segregated and transported by construction contractors or other private haulers to an area recycling facility. The Vasco Road Landfill and the Pleasanton Garbage Service both have collection bins for recyclables.

Wastewater generated during construction will include sanitary waste and could include equipment washwater and stormwater runoff. Sanitary waste will be collected in portable, self-contained toilets. Equipment washwater will be contained at designated wash areas and will either be disposed of offsite or discharged to the onsite evaporation ponds. Stormwater runoff will be managed in accordance with a stormwater management permit, which will be obtained prior to the start of construction. The generation of nonhazardous wastewater will be minimized through water conservation and reuse measures.

Most of the hazardous waste generated during construction will consist of liquid waste, such as flushing and cleaning fluids, passivating fluids, and solvents. Some solid waste in the form of welding materials and dried paint may also be generated. Nonhazardous materials will be used whenever possible to minimize the quantity of hazardous waste generated. The construction contractor will be the generator of hazardous construction waste and will be responsible for proper handling in compliance with all applicable federal, state, and local laws and regulations, including licensing, training of personnel, accumulation limits and times, and reporting and recordkeeping. The hazardous waste will be collected in satellite accumulation containers near the points of generation. This waste will be moved daily to the contractor's 90-day hazardous waste storage area, located at the plant construction laydown area. The waste will be delivered to an authorized hazardous waste management facility, prior to the expiration of the 90-day storage limit.

8.13.4.2 Operation Phase

The primary waste generated during the operation phase will be nonhazardous wastewater from plant operation. Nonhazardous solid waste will also be generated, as well as varying quantities of liquid and solid hazardous waste. Handling and mitigation of these wastes is described in the following subsections.

Nonhazardous Wastes. The wastewater from plant operation will be collected, passed through a brine concentrator, and discharged to the evaporation ponds. Water that is recovered from the brine concentrator will be stored in the distillate storage tanks for feedwater to the demineralizer. Although about 80 percent of the water used to operate the generating facility will be lost through evaporation from the cooling tower, the remaining 20 percent that is recycled will be returned to the facility for reuse, if possible, or evaporated with the concentrated brine in the evaporation ponds.

Wastewater from facility sinks and toilets will be discharged to an onsite septic tank system.

Nonhazardous solid waste or refuse will be collected by the local collection company (Livermore-Dublin Disposal) and deposited in a county landfill. Since Livermore-Dublin Disposal does not offer recycling pickup services for commercial businesses, the EAEC will need to deliver their recyclables to a local collection station or hire another company to pick up their recyclable materials. Recycling will be implemented throughout the facility to minimize the quantity of nonhazardous waste that must be disposed of in a landfill.

Hazardous Wastes. To avoid the potential effects on human health and the environment from the handling and disposal of hazardous wastes, procedures will be developed to ensure proper labeling, storage, packaging, recordkeeping, and disposal of all hazardous wastes. The following general procedures will be employed:

- EAEC will be classified as a hazardous waste generator. Prior to facility startup, application will be made to CalEPA for a USEPA identification number.
- Hazardous wastes will not be stored onsite for more than 90 days and will be accumulated according to CCR Title 22.
- Hazardous wastes will be stored in appropriately segregated storage areas surrounded by berms to contain leaks and spills. The bermed areas will be sized to hold the full contents of the largest single container and, if not roofed, sized for an additional 20 percent to allow for rainfall. These areas will be inspected daily.
- Hazardous wastes will be collected by a licensed hazardous waste hauler, using a hazardous waste manifest. Wastes will only be shipped to authorized hazardous waste management facilities. Biannual hazardous waste generator reports will be prepared and submitted to the Department of Toxic Substances Control (DTSC). Copies of

manifests, reports, waste analyses, and other documents will be kept onsite and remain accessible for inspection for at least 3 years.

- Employees will be trained in hazardous waste procedures, spill contingencies, and waste minimization.
- Procedures will be developed to reduce the quantity of hazardous waste generated. Nonhazardous materials will be used instead of hazardous materials whenever possible, and wastes will be recycled whenever possible.

Specifically, hazardous waste handling will include the following practices. Handling of hazardous wastes in this way will minimize the quantity of waste deposited to landfills:

- Waste lubricating oil will be recovered and recycled by a waste oil recycling contractor. Spent oil filters and oily rags will be recycled.
- Spent SCR and oxidation catalysts will be recycled by the supplier, if possible, or disposed of in a Class I landfill.
- Chemical cleaning wastes will consist of alkaline and acid cleaning solutions used during pre-operational chemical cleaning of the boiler system of the HRSGs, acid cleaning solutions used for chemical cleaning of the HRSG after the unit is put into service, and turbine wash and HRSG fireside washwaters. These wastes, which are subject to high metal concentrations, will be stored temporarily onsite in portable tanks and disposed of offsite, in accordance with applicable regulatory requirements. Disposal may consist of offsite treatment, recovery of metals, and/or landfilling.

8.13.4.3 Facility Closure

When EAEC is closed, both nonhazardous and hazardous wastes must be handled properly. Closure can be temporary or permanent. Temporary closure would be for a period of time greater than the time required for normal maintenance, including overhaul or replacement of the combustion turbines. Causes for temporary closure could be a disruption in the supply of natural gas, flooding of the site, or damage to the plant from earthquake, fire, storm, or other natural causes. Permanent closure would consist of a cessation in operations with no intent to restart operations and could be due to the age of the plant, damage to the plant beyond repair, economic conditions, or other unforeseen reasons. Handling of wastes for these two types of closure are discussed below.

Temporary Closure. For a temporary closure, where there is no release of hazardous materials, facility security will be deployed on a 24-hour basis, and the CEC will be notified. Depending on the length of shutdown necessary, a contingency plan for the temporary cessation of operations will be implemented. This plan will be prepared prior to EAEC startup. The plan will be developed to ensure conformance with all applicable LORS and the protection of public health and safety and the environment. The plan, depending on the expected duration of the shutdown, could include draining all chemicals from storage tanks and other equipment and the safe shutdown of all equipment. All wastes will be disposed of according to applicable LORS, as discussed in Section 8.13.7.

Where the temporary closure is in response to facility damage, or where there is a release or threatened release of hazardous waste or materials into the environment, procedures will be followed as set forth in an RMP. The RMP is described in Section 8.12.6.4. Procedures include methods to control releases, notification of applicable authorities and the public, emergency response, and training for generating facility personnel in responding to and controlling releases of hazardous materials and hazardous waste. Once the immediate problem of hazardous waste and materials release is contained and cleaned up, temporary closure will proceed as described for a closure where there is no release of hazardous materials or waste.

Permanent Closure. The planned life of the generation facility is 30 years, though operation could be longer. When the facility is permanently closed, the handling of nonhazardous and hazardous waste and hazardous materials will be part of a general closure plan that will attempt to maximize the recycling of all facility components (see Section 4). Unused chemicals will be sold back to the suppliers or other purchasers or users. All equipment containing chemicals will be drained and shut down to protect public health and safety and the environment. All nonhazardous wastes will be collected and disposed of in appropriate landfills or waste collection facilities. All hazardous wastes will be disposed of according to applicable LORS. The site will be secured 24 hours per day during the EAEC decommissioning activities.

8.13.5 Cumulative Impacts

The EAEC facility will generate nonhazardous solid waste that will add to the total waste generated in Alameda County and in California. However, there is adequate recycling and landfill capacity in Alameda County to recycle and dispose of the waste for the next 15 to 20 years. This capacity is described in Section 8.13.3.2. Therefore, the impact of the project on solid waste recycling and disposal capability is not significant.

Hazardous waste generated will consist of waste oil, filters, SCR and oxidation catalysts, and fluids used to clean the HRSGs and piping. The waste oil and catalysts will be recycled. Cleaning and flushing fluids will be removed and disposed of offsite. Cleaning and flushing will occur only periodically. Hazardous waste treatment and disposal capacity in California is more than adequate. Therefore, the effect of EAEC on hazardous waste recycling, treatment, and disposal capability is not significant.

8.13.6 Waste Monitoring

Because the environmental impacts caused by construction and operation of the facility are expected to be minimal, extensive monitoring programs will not be required. Generated waste, both nonhazardous and hazardous, will be monitored during project construction and operation in accordance with the monitoring and reporting requirements mandated by the regulatory permits to be obtained for construction and operation.

No wastewater will be discharged from the plant; it will be placed in onsite evaporation ponds, shipped offsite for disposal, or, in the case of sanitary wastewater, discharged to a septic tank system (see Section 8.14). Discharge monitoring will be implemented as required by permits.

8.13.7 Laws, Ordinances, Regulations, and Standards

Nonhazardous and hazardous waste handling at EAEC will be governed by federal, state, and local laws. Applicable laws and regulations address proper waste handling, storage, and disposal practices to protect the environment from contamination and protect facility workers and the surrounding community from exposure to nonhazardous and hazardous waste. The LORS applicable to waste handling at the EAEC facility are summarized in Table 8.13-3.

8.13.7.1 Federal

Wastewater is regulated by USEPA under the CWA. No wastewater will be discharged from the plant; it will be placed in onsite evaporation ponds, shipped offsite for disposal, or, in the case of sanitary wastewater, discharged to a septic tank system (see Section 8.14).

The federal statute that controls both nonhazardous and hazardous waste is RCRA, 42 USC Sections 6901, et seq., and its implementing regulations found at 40 CFR 260, et seq. Subtitle D makes the regulation of nonhazardous waste the responsibility of the states; federal involvement is limited to establishing minimum criteria that prescribe the best practicable controls and monitoring requirements for solid waste disposal facilities. Subtitle C controls the generation, transportation, treatment, storage, and disposal of hazardous waste through a comprehensive "cradle-to-grave" system of hazardous waste management techniques and requirements. It applies to all states and to all generators of hazardous waste (above certain levels of waste produced). EAEC will conform with this law in its generation, storage, transport, and disposal of any hazardous waste generated at the facility. The USEPA has delegated its authority for implementing the law to the State of California.

8.13.7.2 State

Nonhazardous solid waste is regulated by the California Integrated Waste Management Act (CIWMA) of 1989, found in Public Resources Code (PRC) Sections 40000, et. seq. This law provides an integrated statewide system of solid waste management by coordinating state and local efforts in source reduction, recycling, and land disposal safety. Counties are required to submit Integrated Waste Management Plans to the state. This law directly affects Alameda County and the solid waste hauler and disposer that will collect EAEC solid waste. It also affects EAEC to the extent that hazardous wastes are not to be disposed of with solid waste.

Wastewater is regulated by the State and Regional Water Quality Control Boards under the Porter-Cologne Water Quality Control Act. No wastewater will be discharged from the plant; it will be placed in onsite evaporation ponds, shipped offsite for disposal, or, in the case of sanitary wastewater, discharged to a septic tank system (see Section 8.14).

RCRA allows states to develop their own programs to regulate hazardous waste. The programs must be at least as stringent as RCRA. California has developed its own program in the California Hazardous Waste Control Law (HWCL) (Health and Safety Code Section 25100, et seq.). The HWCL performs essentially the same regulatory functions as RCRA and is the law that will regulate hazardous waste at EAEC, since California has elected to develop its own program. However, the HWCL includes hazardous wastes that are not classified as hazardous waste under RCRA. Since hazardous wastes will be generated at the EAEC facility during construction and operation, the HWCL will require the applicant to adhere to storage, recordkeeping, reporting, and training requirements for these wastes.

TABLE 8.13-3
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Waste Management

LORS	Applicability	Conformance (Section No.)
Federal		
RCRA Subtitle D	Regulates design and operation of solid waste landfills	EAEC solid waste will be collected and disposed of by a collection company in conformance with Subtitle D. Sections 8.13.3.1, 8.13.4, and 8.13.7.1.
RCRA Subtitle C	Controls storage, treatment, and disposal of hazardous waste.	Hazardous waste will be handled by contractors in conformance with Subtitle C. Section 8.13.4.
CWA	Controls discharge of wastewater to the surface waters of the U.S. Will only apply if the facility discharges wastewater, rather than using onsite evaporation ponds.	EAEC will discharge to onsite evaporation ponds. Sections 8.13.2, 8.13.6, and Section 8.14.
California		
California Integrated Waste Management Act (CIWMA)	Controls solid waste collectors, recyclers, and depositors.	EAEC solid waste will be collected and disposed of by a collection company in conformance with the CIWMA. Sections 8.13.3.1, 8.13.4.1 and 8.13.4.
CA Hazardous Waste Control Law (HWCL)	Controls storage, treatment, and disposal of hazardous waste.	Hazardous waste will be handled by contractors in conformance with the HWCL. Sections 8.13.4.1 and 8.13.4.2.
Porter-Cologne Water Quality Control Act	Controls discharge of wastewater to the surface and ground waters of California. Will apply only if the facility discharges wastewater to surface or groundwater, rather than using onsite evaporation ponds.	EAEC will discharge to onsite evaporation ponds. Sections 8.13.2, 8.13.6 and Section 8.14.
California Code of Regulations, Title 27, Criteria for All Waste Management Units, Facilities, and Disposal Sites	Specifies siting, design, and operational criteria for waste management units such as landfills, surface impoundments, and waste piles	Concentrated brine will be disposed of in onsite evaporation ponds (surface impoundments)
Local		
Alameda County Fire Code	Controls storage of hazardous materials and wastes and the use and storage of flammable/combustible liquids.	Wastes will be accumulated and stored in accordance with Fire Code requirements. Permits for storage containers will be obtained, as needed, from the Alameda County Fire Department. Sections 8.12.6 and 8.13.9.

8.13.7.3 Local

The Alameda County Waste Management Authority will have the responsibility for administering and enforcing the CIWMA for solid, nonhazardous waste for EAEC.

For hazardous waste, local regulation consists primarily of the administration and enforcement of the HWCL. The Alameda County CUPA is the local entity that will regulate hazardous waste at the EAEC. For emergency spills, the Alameda County HazMat Support

Unit will be primarily responsible for containment and cleanup. This team is based at Alameda County Fire Station No. 4, 20336 San Miguel Avenue, Castro Valley. Teams from San Joaquin County or Contra Costa County may also respond to hazardous material incidents under a mutual aid agreement.

8.13.7.4 Codes

The design, engineering, and construction of hazardous waste storage and handling systems will be in accordance with all applicable codes and standards, including:

- The Uniform Fire Code
- The Uniform Building Code
- The Uniform Plumbing Code

8.13.8 Involved Agencies

Several agencies, including USEPA at the federal level and CalEPA at the state level, regulate nonhazardous and hazardous waste and will be involved in the regulation of the waste generated by EAEC. The hazardous waste laws, however, are administered and enforced primarily through local agencies. For EAEC, the primary agency for hazardous waste issues will be the Alameda County Environmental Health Department, which is the designated CUPA for the area. The agencies and persons to contact for each type of waste are shown in Table 8.13-4.

TABLE 8.13-4
Agency Contacts for EAEC Waste Management

Topic	Agency	Address	Contact	Title	Telephone
Nonhazardous Waste					
Solid Waste Planning, Source Reduction & Recycling	Alameda County Waste Management Authority	777 Davis Street, Suite 100 San Leandro, CA 94577	Lois Clarke	Program Manager	510/614-1699
Solid Waste	Alameda County, Environmental Health Department	1131 Harbor Bay Parkway Alameda, CA 94502-6577	Karen Moroz	Senior Registered Environmental Health Specialist	510/567-6757
Hazardous Waste					
Hazardous	Alameda County, Environmental Health Department	1131 Harbor Bay Parkway Alameda, CA 94502-6577	Rob Weston	Senior Hazardous Materials Specialist	510/567-6700

8.13.9 Permits Required and Permit Schedule

Table 8.13-5 lists the permits required by Alameda County.

TABLE 8.13-5
Permits Required and Permit Schedule for EAEC Waste Management

Permit	Applicability	Schedule for Permit
Hazardous Materials Storage Permit	Requires that businesses obtain permits for hazardous materials and waste storage.	Prior to storage of hazardous waste at the site.
Flammable or Combustible Liquids Storage Permit	Alameda County Fire Code requires that businesses obtain permits for the use and storage of flammable and combustible liquid wastes.	Prior to storage of flammable or combustible liquid wastes at the site.
Waste Discharge Requirements	Issued by Regional Water Quality Control Board for discharge of wastewater to land, surface water, or groundwater	Prior to discharge to ponds

8.13.10 References

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8.14 Water Resources

This section evaluates the effect of the EAEC project on water resources. Section 8.14.1 describes the hydrologic setting, Section 8.14.2 characterizes the sources of water, and Section 8.14.3 discusses precipitation, storm runoff, and drainage. Section 8.14.4 discusses the project's effects on water resources. Mitigation is discussed in Section 8.14.5. Section 8.14.6 provides the proposed monitoring plans and compliance verification procedures. Section 8.14.7 discusses cumulative impacts. Section 8.14.8 discusses the governing water resources LORS and project conformity. Section 8.14.9 presents the LORS compliance strategy. Section 8.14.10 lists the permits required, and Section 8.14.11 provides agency contacts. Section 8.14.12 provides the references consulted in preparing this section.

Water resources potentially affected by the proposed EAEC project include effects on water supply, surface and groundwater water quality, stormwater and flood hazards. The following water resources impacts were investigated:

- Effects on surface waters
- Effects on groundwater recharge, degradation, or depletion
- Stormwater impacts
- Flooding impacts

8.14.1 Hydrologic Setting

The climate in the project area is typical of the Central Sacramento Valley with hot dry summers and mild winters. Daytime temperatures during the summer months range between 80 and 100, with peak days up to 110°F. The rainy season generally extends from November through March. Occasional rains occur during the spring and fall months, but summer months are dry. Average annual precipitation is about 12 inches. Total elevation range on the site is from 20 to 60 feet.

The project site is located near the southwestern edge of the Sacramento-San Joaquin River Delta (Delta). This area is characterized by a series of natural and man-made stream channels, canals, and drains that form low-lying islands. The foothills of the Coast Range (see Section 8.15) are approximately 3 miles southwest of the site and generally define the southwestern edge of both groundwater and surface water resources.

High-quality surface water resources and groundwater of variable quality characterize the project site and the southern Delta. Both groundwater and surface water are used to meet local domestic and irrigation demands. Locally, shallower wells provide low-quality water to individual domestic users. Deeper wells provide better-quality water to communities (Brentwood, Discovery Bay, and Tracy) and local irrigators.

8.14.1.1 Surface Water

Description. Because of its location near the confluence of two major river systems, the area surrounding the project site has abundant surface water features (Figure 8.14-1). In addition to the natural river systems, the diversion facilities for both the Central Valley Project and the State water project are located within several miles of the project site. These aqueducts convey nearly 6,000,000 AFY of municipal, industrial, and agricultural water to the southern portion of California and play a significant role in the movement of water throughout the state. Because of its high quality and ready access, surface water is extensively used in the project area. An estimated 1,700,000 AFY of water from the Delta is diverted by local water users.

The project linears (gas, electric, and transmission lines) are in the same general location as the project site, and would affect the same significant surface waters as those identified above.

San Joaquin River. The San Joaquin River is the southern of the two rivers that form the Delta. In the project area, the San Joaquin River is a system of natural and man-made waterways and has multiple channels in the southern part of the Delta. Old River, one of the main San Joaquin River channels, is located approximately 1 mile northeast of EAEC.

In addition to conveying Delta flows, Old River receives return water from irrigation ditches, most of the agricultural fields in the project vicinity and Mountain House Creek which drains the eastern slopes of the Coastal foothills. Old River supports all typical beneficial uses of the Delta, including irrigation, municipal, industrial, and cold- and warmwater habitat. An agriculture/stormwater drainage ditch runs north toward Old River along the east side of the project site and from the west into the intake of the Delta-Mendota Canal.

State Water Project. The State Water Project (SWP) facilities are located approximately 2 miles west of the project site. The SWP is operated by the California Department of Water Resources (DWR) to provide urban and agricultural water to its contracted customers. The SWP delivers water to two-thirds of the residents of California. Seventy percent of the SWP customers are urban users.

The SWP facilities in the project vicinity include Clifton Court Forebay, which is the most prominent surface water body near the site. Approximately 2 miles west of the project, the Harvey O. Banks (Banks) Pumping Plants and Skinner Fish Facility move water from the Clifton Court Forebay to the California Aqueduct.

Central Valley Project. The Central Valley Project (CVP), operated by the U.S. Bureau of Reclamation (USBR), supplies water to its agricultural, municipal, and wildlife refuge customers throughout the Central Valley. The CVP transports approximately 20 percent of the state's developed water. Approximately 0.5 mile west of the project, the Tracy Pumping Plant and Tracy Fish Screen move water from the Delta to the Delta-Mendota Canal.

Local Use. BBID is the local retail water supplier, providing surface water to such beneficial uses as agriculture, industrial, and municipal entities in the vicinity of the project. BBID diverts surface water pursuant to its pre-1914 water rights from the intake on the California Aqueduct upstream of the Banks Pumping Plant and downstream of the Skinner Fish Screen. The Department of Water Resources consented to BBID's perpetual use of the SWP facilities in exchange for BBID allowing DWR to destroy a portion of its lateral during the construction of the Banks Pumping Plant. Water diverted by BBID is then conveyed through the southern portion of the District along Canal 45 (Figure 8.14-1) and south of Kelso Road. Surface water is conveyed through the area via a series of ditches and pipelines.

Water Quality. Table 8.14-1 summarizes the expected water quality of BBID current water sources.

TABLE 8.14-1
Summary of Local Surface Water and Groundwater Quality

Constituent	Units	Surface Water[a]	Groundwater[b]
Cations			
Calcium	mg/L	15	120
Magnesium	mg/L	8	98
Sodium	mg/L	28	760
Potassium	mg/L	4	3.4
Iron, dissolved	mg/L	0.03	NA
Manganese	mg/L	0.02	10
Anions			
Sulfate	mg/L	30	640
Chloride	mg/L	33	980
Fluoride	mg/L	0.05	0.3
Nitrate	mg/L	0.06	14
Nitrite	µg/L	NA	NA
Bicarbonate alkalinity	mg/L	57	NA
Metals			
Aluminum	µg/L	NA	NA
Antimony	µg/L	NA	NA
Arsenic	µg/L	0.0017	6
Barium	µg/L	151	NA
Cadmium	µg/L	<1.0	NA
Copper	µg/L	0.004	NA
Lead	µg/L	0.0024	NA
Nickel	µg/L	<10.0	NA
Manganese	µg/L	0.02	10
Mercury	µg/L	<1.0	NA
Selenium	µg/L	0.0006	NA
Zinc	µg/L	0.007	NA
Other			
pH	std units	NA	NA
Hardness as CaCO3	mg/L	230	700
Hydroxide alkalinity	mg/L	NA	NA
Conductivity	µmhos/cm	NA	4570

[a]Data from BBID.
[b]Data from Well 01S/04E-33M01 Sampled on 6-6-79. (Keeter, 1980).
[c]NA – analysis not conducted.

8.14.1.2 Groundwater

Description. The project area overlies the Mountain House alluvial fan, which is approximately 150 to 200 feet thick at the site. The deep aquifer is used for potable supply at the Discovery Bay and Brentwood communities, approximately 8 miles north of the site. Quality and yield in that area are good, but the aquifer used by Discovery Bay appears not to extend to the project site (Figure 8.14-2).

Shallow groundwater in the Mountain House area moves from the upper reaches of the alluvial fans towards surface water features in the low-lying delta areas. Available groundwater information near the project site indicates that shallow groundwater occurs at depths of 0 to 10 feet below grade. Groundwater movement is very slow, due to lack of irrigation pumping, permeability, and high water table in the Delta (Hill and Associates, 1964). Vertical groundwater movement is impeded by a relatively thin water-bearing section of less than 200 feet above the poorly permeable and strongly confined deeper aquifers. Groundwater recharge in the area occurs from percolation of applied irrigation water and canal seepage losses (Hill and Associates, 1964). Because of the shallow groundwater, farmers frequently tile their fields to enhance drainage and protect crops from root damage.

Local Use. The closest larger-scale potable users of groundwater are in Discovery Bay and Brentwood, located approximately 8 miles northwest of the project site. These public water supply wells obtain water from the Kellogg Creek fan and deeper deposits. Shallow groundwater is used near the project to meet domestic demands. There is a well reported near the residence at Kelso and Mountain House Road, but the quality and yield are reported to be poor.

Quality. There are no significant water quality data for the shallow aquifer in the project area. Shallow groundwater at a depth of 15 to 40 feet is reported to be saline and of poor quality. The limited available water quality data are summarized in Table 8.14-1.

8.14.1.3 Flooding Potential

The project area is protected from flooding by levees and drainage channels to the west and north. FEMA flood zone maps show that the EAEC project site and all project linears except the recycled waterline are outside the 100-year flood boundary (Figure 8.14-3). FEMA-designated 100-year flood plains in the project vicinity occur within approximately 2,000 feet of the south bank of Old River. The recycled waterline appears to intersect the 100-year flood plain at Wicklund Road. In practice, this will not be in the flood plain when MHCSD WWTP is built. There are no other designated flood plains in the vicinity of the project (FEMA, 2000, 1988, 1980).

8.14.2 Facility Water Demands and Disposal

This section characterizes the sources of water needed for power generation at EAEC, water quality, and disposal of wastewater.

8.14.2.1 Water Sources

As presented in Sections 2.0 and 7.0, the project will require approximately 4,600 AFY of water (up to 7,000 AFY during peak years) provided by BBID to meet its cooling and process demands. The relatively small domestic demands for the generating facility's employees would be provided either from an onsite well or from the local domestic potable supply system that currently provides domestic water for Western and the state and federal facilities in the area. Bottled water will be used for EAEC drinking water. As described in Section 7.0, BBID is currently evaluating the feasibility of using recycled water from MHCSD WWTP to supply the project. The Applicant is committed to using as much recycled water as BBID can provide. Additional details about recycled water supply are provided in Section 7.1.2.

Surface Water. As noted above, the project is completely within the BBID service area. BBID is a multi-county special district established under State law for the purpose of providing water to land in Alameda, Contra Costa, and San Joaquin counties. BBID has 60,000 AFY of pre-1914 water rights with a priority date of May 18, 1914.

To evaluate the potential for surface water impacts from the project, it is important to understand three critical elements of BBID's water rights and operations:

1. Through conservation and recent reductions in agricultural customer diversions, BBID has reduced its water use from historic highs, and use by the project would be within the historic pattern of uses.
2. BBID's water rights are senior to the SWP and CVP, which are the major diverters from the Delta. Therefore, the SWP and CVP must adjust operation of their diversion facilities to accommodate changes in diversions by BBID and to mitigate environmental impacts, if any, associated with a change in BBID water demand.
3. BBID's water sold to the project represents less than 0.1 percent of the total water diverted from the Delta by the SWP, CVP, BBID, and other users. Most of these users hold water rights junior to BBID's pre-1914 right. Interannual variation in supply and use of Delta diversions far exceeds 0.1 percent.

Historical BBID Water Uses. BBID's water rights are based on widespread agricultural uses prevalent in its service area since the early 1900s. Water use within the BBID service area is, however, changing over time. Water use for agricultural purposes has recently varied between approximately 56,000 AF in 1977 to about 24,023 AF in 1983 (Figure 8.14-5).

The variation in demand for irrigation water is due to a number of factors. Previous farm program policies encouraged certain land to be taken out of production from year to year. Moreover, conservation efforts instituted by agricultural users have caused BBID's diversion rates to decline in the last 10 years. Under California law, a reduction in use due to water conservation efforts is deemed equivalent to a reasonable beneficial use of water to the extent of the reduction in use [California Water Code, Section 1011(a)]. BBID historically used 3.6 AF per acre for irrigation, and current use is approximately 3.0 AF per acre annually.

In addition, conversion of land from agriculture to urban use has reduced BBID's irrigation water demands. To meet the changing needs of the service area, BBID is dedicating a growing portion of its entitlement to municipal and industrial use. BBID expects this trend to continue in response to continuing pressure to provide water to communities for burgeoning Bay Area and Central Valley populations.

The most recent projections of population growth, development, and agricultural conversion were evaluated by BBID to determine whether water supplies were adequate to serve future customers. Based on BBID's projected future water uses, it is apparent that BBID continues to have sufficient water to meet its current and future obligations. Table 8.14-2 compares BBID's water rights and its current and projected water demands as projected prior to consideration of this project. The data show that there is more than sufficient water supply available to serve the project demands without impinging BBID's existing or projected uses.

TABLE 8.14-2
BBID Projected Average Annual Demands (AFY)

Demand Type	2000[a]	2010	2020	2030	2040
Total District Water Right	60,000	60,000	60,000	60,000	60,000
Agricultural Use	31,000	34,300	31,400	28,500	25,600
Identified Municipal and Industrial Use					
Discovery Bay West	-	500	500	500	500
Unimin Industrial Use	700	1,500	1,500	1,500	1,500
Mountain House (RWSA 1)[b]	-	4,641	9,415	9,415	9,415
Tracy Hills (RWSA 2)[c]		6,000	6,000	6,000	6,000
East County Airport	-	1,100	1,200	1,200	1,300
Byron	-	500	600	700	700
Subtotal—Identified M&I Use	**700**	**14,241**	**19,215**	**19,315**	**19,415**
Total—Agricultural and Identified M&I Use	**31,700**	**48,541**	**50,615**	**47,815**	**45,015**

Source: CH2M HILL, 1999.
[a]Rick Gilmore, BBID Manager (August 2, 2000).
[b]Raw Water Service Area No. 1 is the specific title of Mountain House delivery area.
[c]Raw Water Service Area No. 2 is the Tracy Hills delivery area.

8.14.2.2 Relationship of BBID to CVP and SWP

In evaluating the potential for surface water impacts from the project, BBID's diversions need to be considered in the context of other major diverters that use the same water source. The primary diverters are the CVP and SWP described above. The diversions made by the CVP and SWP are subject to the water rights of BBID since their rights to water are junior in priority to BBID's pre-1914 water rights. Therefore, their operations, including operations for environmental purposes, cannot interfere with diversions made by BBID pursuant to its senior water rights.

CVP and SWP operations are controlled by numerous criteria that reflect conditions in the Delta in real time. These criteria are set forth in their permits for water from the State Water Resources Control Board (SWRCB), requirements under biological opinions and agreements between the SWP, CVP, and USFWS, CDFG, and NMFS. The criteria were established primarily to minimize the environmental effects of the CVP and SWP and to avoid interfering with diversions by senior rights holders such as BBID. At times, releases from upstream reservoirs are made to enable pumping from Banks, while at other times Banks pumping rates are reduced to avoid adversely affecting the Delta. BBID's water deliveries to its customers are part of the baseline conditions by which the CVP and SWP must operate to meet the conditions of their permits and other environmental requirements.

Recycled Water. The project is committed to using recycled water to the extent it is available. BBID is investigating the potential for developing a recycled water supply to supplement existing raw water supplies in its service area – especially for use at the proposed project. As the area's water purveyor, BBID would be responsible for distributing recycled water. Recycled water in excess of water demands by the project could be conveyed to BBID facilities and other customers to supplement their raw water supplies. BBID is completing a feasibility study regarding the availability and use of recycled water, including estimates of the quality and quantity of recycled water that can be made available from the MHCSD WWTP. Next steps include further discussions and agreements between BBID and MHCSD, and BBID Board adoption of a recycled water plan. The project is committed to using as much recycled water as BBID can provide for the project's needs. The estimates of the quantity and quality of recycled water from the MHCSD WWTP presented in Section 7.0 were provided to the Applicant by BBID based on work performed as part of the Recycled Water Feasibility Study. The analysis of the potential availability of recycled water indicates that it would be feasible to use recycled water from MHCSD WWTP for a portion of the project water demands. Additional details concerning the use of recycled water are included in Section 7.0 of this AFC.

Using recycled water would have positive impacts on the local surface water resources, by reducing the volume of discharges to surface waters. However, the recycled water may also cause some adverse impacts. Because recycled water contains a higher concentration of dissolved solids and other minerals, it cannot be recycled as many times for cooling, and therefore requires a higher volume of use than raw water. Recycled water also results in greater amounts of solid waste from the project's zero-liquid discharge system. Finally, recycled water will vary depending on the source, and contains a wider range of compounds than raw water.

Alternative Cooling. The project cooling design is based on the use of mechanical-draft evaporative cooling to remove cycle waste heat, which results from condensing the steam exhausting from the steam turbine.

Alternative forms of cooling include a "dry" cooling system whereby the steam is condensed directly in an air-cooled condenser and other process heat loads are rejected to the atmosphere using air-cooled fin-fan heat exchangers, and a "wet-dry" system that is a hybrid of the evaporative cooling and dry cooling systems. The use of evaporative cooling is preferable to either a dry cooling system or a wet-dry cooling system because of its lower capital cost, lower operating cost, and higher cycle efficiency.

Water consumption for the project could be reduced significantly with a dry cooling system, reducing the amount of wastewater generated by the facility. Use of a dry or wet-dry technology, although it may reduce water demand and wastewater discharge, may result in a shift in the types of impacts (such as air quality, visual resources, or noise) that the project may cause. Environmental considerations based on cooling system characteristics have been compared and presented in previous cases before the CEC. Staff has found that capital costs for dry cooling towers tend to be two to three times higher than wet systems in general (CEC, 2000). For hybrid systems that require the design and construction of two systems, costs can range from less than to more than dry cooling systems, depending on the systems' ratio of wet to dry in the design. In general these initial cost differences are due to the heat exchanger unit, size of the structures needed, and the fans and motors needed for a given system.

For the EAEC project, the Applicant considered air-cooled condensers as an option to reduce water demand. Based on this analysis, the Applicant found that use of this dry cooling technology would result in a reduction in water use of 94 percent, but an increase in capital and land costs of approximately $40 million.

A dry cooling system would also eliminate the benefits associated with EAEC's potential use of recycled water and the reduction of discharges to the Delta.

A wet-dry cooling system is less efficient and more expensive than an evaporative cooling system and is impractical because of the zero-liquid waste discharge treatment system proposed for the project. That system requires a near steady-state operation to remain stable and controllable. There are no constraints on the monthly availability of water, which would require dry cooling at some times and wet cooling at other times. It appears that a wet-dry cooling system would be the least economically efficient, technically difficult, or infeasible and unjustified. It is likely more costly than either an evaporative or a dry cooling option.

BBID raw water, coupled with recycled water from MHCSD WWTP, as it becomes available, would be an appropriate water source for the project. Other water sources investigated and found to be infeasible at this time included the following:

- Brackish or contaminated groundwater supplies are not proposed because there is insufficient demonstrated yield to meet plant demands in the basin underlying the project site. Also, implementing a zero-liquid discharge treatment system makes the use of poor quality water infeasible.
- Pumping groundwater from the part of the groundwater basin that has sufficient yield to meet plant cooling water demands would potentially adversely affect other users.
- Irrigation return flows are not available in sufficient quantities to meet project demands. Also, the salinity of those flows would result in a greater saline waste flow from the zero-liquid discharge treatment system than would result from raw water use.

Presently, there is no recycled water available to the project site. The project will use recycled water when it becomes available from BBID. BBID is working with MHCSD to evaluate the feasibility of using recycled wastewater as it becomes available in the area.

8.14.2.3 Wastewater Discharges

As discussed in Section 2.0, the industrial wastewater at the site will be recycled in a zero-liquid discharge treatment system. No industrial wastewater will be discharged offsite. Section 8.13 contains a detailed description of the zero-discharge system. As a final step in that process, less than 77,000 gallons per day of concentrated brine would be discharged to onsite evaporation ponds. As detailed in the process flow schematics of Section 2.0, the quantity and quality of water discharged to the onsite evaporation ponds is dependent upon influent water quality. This water quality is anticipated to change as the facility begins receiving recycled water from BBID. Table 8.14-3 shows the estimated quality of brine flowing into onsite evaporation ponds under different source water regimes.

Brine in the evaporation ponds would gradually concentrate leaving a solid precipitate, and a small amount of liquid. The expected quality of the brine estimated for an average day, with either 100 percent raw water from BBID or 100 percent recycled water from the MHCSD WWTP is shown in Table 8.14-3.

TABLE 8.14-3
Estimated Quality of Brine Discharged to Evaporation Ponds
Under two extreme conditions (100% Raw, 100% Recycled) Water

Constituent/Limits Parameter	Concentrated Brine 100% BBID Raw Water	Concentrated Brine 100% Recycled Water
Flow (gpm)	5.2	20.0
Cations (mg/L)		
Calcium	4,663	8,294
Magnesium	1,855	1,099
Sodium	40,650	38,166
Potassium	3,451	4,076
Ammonium	22	378
Total Cations		
Anions (mg/L)		
Bicarbonate	4,113	1,029
Carbonate	0	0
Hydroxide	0	0
Sulfate	62,911	53,064
Chloride	29,682	38,930
Nitrate	2,199	4,674
Phosphate	0	65
Other (mg/L)		
Total Hardness		
Total Alkalinity		
TSS		
Silica	5,635	2,344
Carbon Dioxide		
TDS	150,000	150,000
Metals/Misc. (mg/L)		
Fluoride	38	106
Arsenic	1.3	0.4
Barium	9	2
Beryllium	0.38	0.75
Boron	108	149
Cadmium	0.8	0.1
Chromium	3.1	6.4
Copper	3.1	0.9
Iron	23	37
Lead	1.8	1.0
Manganese	15	3
Mercury	0.01	0.002
Nickel	3.8	0.8
Silver	1.5	0.1
Selenium	0.0004615	0.07
Thallium	0.38	12.5
Zinc	5	1

Shaded entries = Constituent Exceeds Soluble Threshold Limit Concentrations (STLC).

Table 8.14-4
Estimated Quality of Cooling Tower Drift
Under Two Extreme Conditions (100% Raw, 100% Recycled) Water

Constituent/ Parameter	Cooling Tower Drift 100 % Raw Water	Cooling Tower Drift 100 % Recycled Water
Flow (gpm)	1.4	1.4
Cations (mg/L)		
Calcium	87	192
Magnesium	31	40
Sodium	164	455
Potassium	22	58
Ammonium	0	5
Anions (mg/L)		
Bicarbonate	122	122
Carbonate	0	0
Hydroxide	0	0
Sulfate	338	735
Chloride	191	554
Nitrate	3	15
Phosphate	0	15
Other (mg/L)		
Total Hardness	347	645
Total Alkalinity	100	100
TSS	20	20
Silica	110	91
Carbon Dioxide	9.5	9
PH	7.3	7.3
TDS	974	2,246
Metals/Misc. (mg/L)		
Fluoride	0.29	2.124
Arsenic	0.0097	0.015
Barium	0.865	0.036
Beryllium	0.006	0.03
Boron	0.80	3
Cadmium	0.006	0.006
Chromium	0.023	0.129
Copper	0.023	0.0174
Iron	0.17	0.736
Lead	0.0137	0.0194
Manganese	0.11	0.069
Mercury	0.006	0.0000332
Nickel	0.06	0.0153
Silver	0.06	0.006
Selenium	0.0000034	0.003
Thallium	0.006	0.251
Zinc	0.040	0.03

Because the MHCSD WWTP is not yet operational, water quality data were estimated using treated wastewater from Delta Diablo Sanitation District (DDSD), located in Pittsburg, California. While these data were considered reasonably close to what would be expected from the yet-to-be-built MHCSD WWTP, DDSD serves a number of heavy industries that probably contribute a higher load of metals to the wastewater stream than would result from the MHCSD WWTP. In this way, DDSD is considered a conservative estimator of the brine quality that would be discharged to onsite evaporation ponds. All constituents shown in Table 8.14-3 are at concentrations below those that would be classified as hazardous waste, with the exception of chromium and thallium. The Applicant believes that these two constituents would not be present in elevated concentrations in the brine discharged at the project for two reasons: (1) the project would be unlikely to ever meet the total water supply using recycled water only (projected supply is inadequate for this). Therefore, the concentration of constituents in the brine would be intermediate between that resulting from either 100 percent raw water or 100 percent recycled water from MHCSD WWTP, and (2) water quality from the MHCSD WWTP is expected to be better (lower concentration of metals) than water from DDSD because there would be no heavy industry served by the MHCSD WWTP. During operation, the Applicant would be responsible for monitoring the quality of the brine according to the terms of the Waste Discharge Requirements issued by the CVRWQCB to be certain that permitted criteria were not exceeded. The constituents of the brine are expected to be non-hazardous, and at intervals would require excavation and removal, either as brine or solid salt cake. There would be no process wastewater discharge offsite.

The only other potential liquid discharge is from cooling tower drift. The quality of water in the cooling towers is dependent upon the quality of source water from BBID or the MHCSD WWTP. Table 8.14-4 describes the estimated quality of circulating water in the cooling towers based upon 100 percent BBID raw water and 100 percent MHCSD recycled water. The estimated quality does not indicate concentrations of constituents that would be expected to cause adverse effects.

8.14.2.4 Water Demand

The estimated monthly water requirements for year 1 and year 20 for the project are shown in Tables 7-1A and 7-1B, respectively. Initially, the 4,600 AF (7,000 AF maximum) annual demand of the project would be supplied with raw water from BBID. Table 7-1B presents the estimated use of recycled water for the energy center upon buildout of the MHCSD WWTP.

8.14.2.5 Water Flow and Treatment

The mass balances of water flow and treatment include varying water requirements for different operational conditions. Section 2.0 discusses the facilities for treatment and use of project water. Water balances are presented on Figures 2.2-6a through 2.2-6f. Section 7.0 discusses the facilities for supply and conveyance.

8.14.3 Precipitation, Stormwater Runoff, and Drainage

Most of the precipitation in the project area falls between November and April. Monthly average rainfall in Tracy, which is similar to that at the project site, is presented in Table 8.14-5. The total annual average rainfall in Tracy is 10 to 12 inches.

TABLE 8.14-5
Average Monthly Rainfall near the Proposed Project Site (Tracy) 1950 – 1998

Precipitation	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Rainfall (in.)	2.38	1.92	1.71	0.80	0.22	0.14	0.05	0.10	0.26	0.67	1.88	1.72

8.14.3.1 Stormwater Runoff Prior to Construction

Currently, stormwater runoff from the project site runs by sheet flow to the north, where it is collected in an east-west running drainage ditch which, in turn, discharges into a north-south running drainage ditch that runs along the east side of the property. The north-south running drainage ditch drains to the north and discharges into the intake channel of the Delta-Mendota Canal. Table 8.14-6 shows the rainfall depth expected at various return frequencies and the corresponding total runoff expected at the site. The site is currently farmed, with soil types that have poor drainage.

The total runoff values indicated in Table 8.14-6 are based on the runoff from a site area of 23.7 acres. This allows a direct comparison to the portion of the final developed site area that will have surface runoff collected by inlets, storm sewer piping, and channels and directed to the proposed stormwater detention pond.

TABLE 8.14-6
Stormwater Runoff Prior to Construction

Return Period of Storm (years)	Rainfall Depth for 24-hr Storm[a] (inches)	Total Runoff from Site for 24-hr Storm[b] (millions of gallons)
10	2.9	0.746
25	3.2	0.824
50	3.8	0.978
100	3.9	1.004

[a]From Technical Paper 40 – Rainfall Frequency Atlas of the United States.
[b]Represents 23.7-acre area, which will drain to proposed stormwater detention basin, factored for surface condition.

8.14.3.2 Storm Runoff After Construction

Alameda County requires than any grading be permitted pursuant to County Ordinance 15.36 *et seq*. The grading permit requires that an erosion and sediment control plan be prepared to prevent increased discharge of sediment during grading and development. After construction, the site would be designed to drain stormwater runoff to an onsite detention pond. From the detention pond, the stormwater will be discharged into the existing drainage ditch, which runs along the east side of the project site. The peak discharge from the detention pond will be regulated to less than the pre-construction flow rate. Figure 8.14-4 shows the post-construction runoff and drainage patterns. Table 8.14-7 indicates the total stormwater runoff after construction for the 23.7-acre portion of the developed site that will drain to the stormwater detention pond via a system of pipes, channels, and drains. The wastewater recycle pond, cooling tower, evaporation ponds, landscaping, and natural areas will cover the remaining portion of the 55-acre developed site. The post-construction stormwater runoff from these areas will be significantly less than the pre-construction runoff as a result of the stormwater captured in the wastewater recycle pond, cooling tower, and evaporation ponds.

TABLE 8.14-7
Stormwater Runoff Following Construction

Return Period of Storm (years)	Rainfall Depth for 24-hr Storm[a] (inches)	Total Runoff from Site for 24-hr Storm[b] (millions of gallons)
10	2.9	1.344
25	3.2	1.483
50	3.8	1.761
100	3.9	1.807

[a]From Technical Paper 40 – Rainfall Frequency Atlas of the United States.
[b]Represents 23.7-acre area, which will drain to proposed stormwater detention basin, factored for surface condition.

8.14.4 Effects on Water Resources

The project's direct effects on local water resources would be limited to those associated with using groundwater for domestic needs and using recycled water when it becomes available. Best Management Practices (BMPs) for erosion and sediment control would be implemented during construction to avoid runoff polluting surface waters. The groundwater demand would be so small as to have no significant effect on other users. There would also be no effect from the project on the 100-year flood plain.

8.14.4.1 Surface Water

The Project's use of raw water from BBID for process makeup and cooling is not expected to have a significant impact upon the water resources in the area. BBID will use existing supplies available as part of its pre-1914 rights to serve the project. BBID has indicated those supplies are adequate to meet the needs of the energy center (see "Will Serve" letter, Appendix 8.14A). BBID's intake structure on the intake channel to the Harvey O. Banks Pumping Plant is downstream of the Skinner Fish Screen, and no new intake structures would be constructed in the intake channel. In the future, the state intends to upgrade the Skinner Fish Screen providing state-of-the-art fisheries protection at both the Banks pumping plant and the BBID intake.

Since the BBID intake is located on the intake from Clifton Court Forebay, the physical impacts of its diversions are not distinguishable from the diversions of the SWP at Banks Pumping Plant. Moreover, because BBID water rights are senior to those of the SWP, its diversions are part of the baseline conditions upon which SWP operations are based. Thus, if BBID makes a change in the timing or amount of water diverted, these changes do not affect the Delta; they are instead offset by changes in SWP operation.

Even though changes in BBID's diversions could result in some alteration of the operations of the SWP, diversions associated with the proposed energy center constitute less than 0.1 percent of the water diverted by the CVP and SWP. Therefore, diversions made by BBID for the project are virtually undetectable and will not appreciably alter the operations of the SWP or CVP, or the environment.

Delta Restoration Plans. To address a variety of environmental issues surrounding the diversion and use of water from the San Francisco Bay and Sacramento/San Joaquin Delta and Estuary, including water use by current and future water users, a federal-state accord, called CalFed, was developed. CalFed is a consortium of state and federal agencies and municipal and agricultural water users. It was formed to implement long-term and comprehensive plans to restore ecological health and improve water management for beneficial uses of the Bay-Delta. CalFed plans address the sometimes competitive needs of various water users, including the environment. Senior water rights holders such as BBID are not affected by CalFed recommendations because their diversions are considered a baseline condition.

Environmental restoration was also the goal of the Central Valley Project Improvement Act (CVPIA), for which the USBR is the lead agency. CVPIA has similar goals to the CalFed program, but focuses on the allocation of specific water rights (800,000 AFY) that are also junior to BBID's water rights. Neither CalFed nor CVPIA direct the diversion of water. However, the manner of diversions is managed within strict operating parameters that adjust operation in response to all other conditions and restrictions affecting the Delta in real time. Any change in diversions associated with the delivery of BBID's water to the proposed energy center would be so small as to be theoretical or as part of the baseline conditions would be directly offset by changes in the diversions at Banks Pumping Plant.

8.14.4.2 Groundwater

The project would potentially use small amounts of groundwater from the shallow aquifer to serve sanitary needs on the project site, but most water needs would be served by BBID which uses primarily surface water. Process wastewater from the site would be directed to onsite evaporation and waste ponds that would be lined and monitored to avoid any contamination of the groundwater from onsite sources pursuant to CCR Title 27. Evaporation and waste ponds constructed onsite would be constructed to a depth of less than 10 feet to avoid direct contact with the shallow aquifer. BMPs would be implemented during construction to avoid contamination of groundwater from construction activities. As a result of these measures, groundwater in the project area would not be significantly affected by the project.

8.14.4.3 Recycled Water

The project would use recycled water to the extent that it is made available from BBID. Recycled water use would have a net positive impact on water resources by reducing the volume of discharges to the San Joaquin River and implementing the State Board's Policy 75-58 for reusing water to the greatest extent practicable.

8.14.4.4 Stormwater

During construction, BMPs for erosion and sediment control would be implemented to avoid polluting surface waters. Minimum setbacks incorporated in the design, BMPs, and onsite drainage structures will protect local surface water from water quality degradation.

8.14.4.5 Water Quality

Local surface water and groundwater quality would not be affected by the project. All industrial wastewater discharges would be discharged to onsite evaporation or waste ponds. Sanitary wastes will either be collected in a holding tank and trucked offsite or treated onsite via a septic tank and leach system. Because an onsite stormwater detention pond will be provided to limit stormwater discharges to pre-construction flow rates, the project will not have a significant effect on the quantity and quality of stormwater runoff.

Stormwater runoff will be controlled during construction and plant operations through adherence to State Water Resources Control Board stormwater pollution prevention plans (SWPPPs). These plans would be prepared as part of the application for both the Construction and General Industrial Stormwater NPDES permits that will be required as part of the project. A description of current erosion conditions is provided in Section 8.9, Agriculture and Soils. Hazardous materials storage and handling and waste handling that must be thoroughly documented in the SWPPPs are presented in Sections 8.12 and 8.13. The Best Management Practices provided in the SWPPPs will protect the water quality of surface waters in the area. No significant impacts to surface water quality are expected as a result of the implementation of the project.

8.14.4.6 Flooding Potential

The project would convert up to 55 acres of the existing poorly drained site to packed gravel and pavement. An onsite stormwater detention pond would be used to limit stormwater discharges to pre-construction flow rates. The project will be constructed outside the 100-year flood plain. There would be no effect from the project in the 100-year flood plain.

8.14.5 Mitigation

There would be no significant impacts to ground or surface water caused by the EAEC project. Therefore, no mitigation will be required:

- The project will use water provided by BBID, including recycled water when it becomes available.
- No adverse impact to beneficial use of surface water would result from water supply to the project, and no mitigation is required.
- The project may use less than 2 AFY of groundwater for onsite domestic uses. This amount is insignificant relative to the productive capacity of the local aquifers. Therefore no mitigation is required.
- The project would implement Best Management Practices during construction to avoid contamination of any groundwater or surface water resources.
- The evaporation ponds proposed for this project would be designed, constructed and operated in accordance with requirements of the CVRWQCB and CCR Title 27 to prevent any adverse impact to surface or groundwaters.

8.14.6 Proposed Monitoring Plans and Compliance Verification Procedures

Routine monitoring would be required as part of the stormwater NPDES permitting of the project. No additional monitoring of surface or groundwater would be required because no water quality impacts are expected to occur.

8.14.7 Cumulative Impacts

Cumulative impacts to water resources could occur through the use of recycled water, the contribution of domestic sewage, the use of groundwater, or stormwater runoff.

None of these categories of water use is expected to result in significant cumulative impacts to area water resources:

- **Surface Water:** The use of surface water for the EAEC will not significantly affect the cumulative impacts of diversion of surface water from the Delta. BBID has existing water resources sufficient to supply the energy center. Use of the water will not materially affect ongoing programs to mitigate the cumulative effects of water diversions in the area.

- **Recycled Water**: The use of recycled water will have a net positive benefit to the cumulative impacts of the potential MHCSD WWTP discharges by reducing total effluent flow to local surface water bodies.

- **Plant Sewage**: The proposed plant staff of up to 40 employees will generate insignificant volumes of treated, domestic sewage; the cumulative impacts from an onsite septic system would not be significant.

- **Groundwater**: The project's groundwater requirements of 2 AFY would not be significant, and therefore would cause no adverse impacts to groundwater resources.

- **Stormwater**: Soils on the project site are described as poorly drained. Implementation of the project would increase runoff on up to 55 acres, due to packed earth and gravel, or pavement construction. The impacts of the increased runoff will be mitigated through the use of a stormwater detention pond designed to maintain the discharge of stormwater below the pre-construction flow rates.

8.14.8 Applicable Laws, Ordinances, Regulations, and Standards

Federal, state, county, and local LORS applicable to water resources and conformance are discussed in this section and summarized in Table 8.14-8.

TABLE 8.14-8
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Water Resources

LORS	Applicability	How Conformance is Achieved	Agency/Contact
Federal			
Clean Water Act(CWA) as implemented by the CVRWQCB	Regulates stormwater discharge by issuing Construction Activity NPDES Stormwater Permit	NPDES permits for construction stormwater. Prior to construction and plant operation.	CVRWQCB Leo Sarmiento 916/255-3049
	General Industrial Stormwater Permit	NPDES permits for industrial stormwater. Required prior to construction and plant operation.	CVRWQCB Sue O'Connell 916/255-3000
Clean Water Act Section 401	Water Quality Certification	Requires water quality certification for any Section 404 permit; delegated to CVRWQCB	CVRWQCB Patricia O'Leary 916/255-3000
Clean Water Act Section 404	Wetlands disturbance	Section 404 permit for work in jurisdictional wetlands. Required prior to any work below the high water mark of the creek.	USACOE Nancy Haley U.S. Army Corps of Engineers 916/557-7772
State			
State Water Resources Control Board	Regulates stormwater discharge	NPDES permits for construction and industrial stormwater. Prior to construction and plant operation.	CVRWQCB Leo Sarmiento 916/255-3049
Title 27, Waste Discharge Requirements	Requires specific design, permitting and monitoring for waste management units (brine ponds).	Applicant will prepare a Report of Waste Discharge (ROWD) and secure WDR prior to operation.	CVRWQCB Victor Izzo Senior Water Quality Engineer 916/255-3000
Title 22 of the CAC	Requirements for the use of sewage effluent in cooling towers	MHCSD has committed to implement tertiary treatment of its effluent to conform to this requirement.	Rick Gilmore General Manager BBID Byron Bethany Irrigation 925/634-3534
California Water Code 13550 *et seq*. And Resolution 75-58	Encourages reuse of water for beneficial use	Project will conform through the use of recycled water when it becomes available from BBID.	Paul Lillebo Environmental Specialist IV 916/341-5551

TABLE 8.14-8
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Water Resources

LORS	Applicability	How Conformance is Achieved	Agency/Contact
CDFG (Fish and Game Code, Section 1601)	Streambed alteration agreement,	401 permit for work affecting surface water. Prior to any work below the high water mark of the creek.	CDFG Warden Joe Powell 707/944-5500
Local			
Alameda County Stormwater Requirements	County Grading Permit includes stormwater control requirements	Requires erosion and sediment control plan, drainage control features and county approval	Alameda County Robert Hale, Manager 510/670-5563
Alameda County Grading Ordinance 15.36.	Permits Grading, Erosion and Sediment Control	Required prior to site grading. Application also comprises CEQA, Geotechnical Report, and Erosion and Sediment Control Plan	Alameda County Grading Department Gary Moore, Grading Supervisor 510/670-5402
BBID Agreement to Serve	User Agreement for BBID water	Applicant has received a will serve letter from BBID, See Appendix 8.14-A	Rick Gilmore General Manager BBID Byron Bethany Irrigation 925/634-3534
East County Area Plan Policies			
Water Resources	*Goal: To provide an adequate, reliable, efficient, safe, and cost-effective water supply to the residents, businesses, institutions, and agricultural uses in East County*	This goal is implemented via conformance with the policies listed below.	Alameda County Senior Planner Bruce Jensen 510/670-6527
	Policy 236: The County shall approve new development contingent on verification that an adequate long-term water supply can be provided to serve the development. The County shall encourage developers of Major New Urban Development to seek new sources of water to supplement existing sources so that there will be sufficient water for smaller infill projects.	The project will use BBID to supply water. BBID has demonstrated ample supply.	
	Policy 239: The County shall discourage water service retailers from constructing new water distribution infrastructure which exceeds future water needs based on the buildout projections of the *East County Area Plan*.	Project will conform.	

TABLE 8.14-8
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Water Resources

LORS	Applicability	How Conformance is Achieved	Agency/Contact
	Policy 240: The County shall support more efficient use of water through such means as conservation and recycling, and shall encourage the development of water recycling facilities to help meet the growing needs of East County.	The project plans to use recycled water as it becomes available through BBID.	
	Policy 242: The County shall include water conservation measures as conditions of approval for subdivisions and other new development.	The project plans to use recycled water as it becomes available through BBID.	
	Policy 243: The County shall require major projects (*see definition in Table 1*) to mitigate projected water consumption by applying one or more Best Management Practices that reduce water consumption off-site.	Project conforms by recycling water internally to the maximum extent practicable.	
	Policy 244: The County shall encourage the efficient use of water for landscape irrigation, vineyards and other cultivated agriculture. To this end, the County shall encourage the use of recycled water, treated by the reverse osmosis or other process and meeting groundwater basin standards set forth by the Regional Water Quality Control Board, for agricultural irrigation.	The project plans to use recycled water as it becomes available through BBID.	
	Policy 245: The County shall encourage Zone 7 and the water retailers to require separate service connections and meters where large quantities of water are used for special purposes such as golf courses and landscape irrigation so that consumption of water for these uses can be managed in times of drought. To this end, the County shall, if feasible, require the use of recycled water for golf courses and shall encourage use of recycled water for non-residential landscaping, irrigated agriculture, and groundwater recharge in accordance with Regional Water Quality Control Board adopted standards.	The project plans to use recycled water as it becomes available through BBID.	
	Policy 245B: The County shall continue to seek alternative methods for economic reuse of wastewater in addition to those already considered.	The project plans to use recycled water as it becomes available through BBID.	
Stormwater	*Goal: To provide efficient, cost-effective, and environmentally sound storm drainage and flood control facilities.*	Project will conform.	

TABLE 8.14-8
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Water Resources

LORS	Applicability	How Conformance is Achieved	Agency/Contact
	Policy 255: The County shall work with Alameda County Flood Control and Water Conservation District to provide for development of adequate storm drainage and flood control systems to serve existing and future development.	Project will conform.	
	Policy 256: The County shall promote flood control measures that advance the goals of recreation, resource conservation (including water quality and soil conservation), groundwater recharge, preservation of natural riparian vegetation and habitat, and the preservation of scenic values of the county's arroyos and creeks.	Project will conform.	
	Policy 257: The County shall require new development to pay its fair share of the costs of East County storm drainage and flood control improvements.	Project will conform.	
	Policy 258: The County shall regulate new development on a case-by-case basis to ensure that, when appropriate, project storm drainage facilities shall be designed so that peak rate flow of stormwater from new development will not exceed the rate of runoff from the site in its undeveloped state.	Project will design storm drainage facilities so that peak flows will not exceed the current rate of runoff. Section 8.14 provides a detailed analysis. EAEC is consistent with this policy.	
	Policy 260: The County shall encourage use of natural or nonstructural stormwater drainage systems to preserve and enhance the natural features of a site.	The project would use an existing detention pond to store water, so that the existing natural stormwater drainage system will be adequate to convey flows. Section 8.14 provides a detailed analysis. EAEC is consistent with this policy.	
Sewer	*Goal: To provide efficient and cost-effective sewer facilities and services.*		Alameda County Senior Planner Bruce Jensen 510/670-6527

TABLE 8.14-8
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Water Resources

LORS	Applicability	How Conformance is Achieved	Agency/Contact
	Policy 252: The County shall support Zone 7's policy which discourages commercial and industrial development using septic tanks.	The project would use onsite treatment or septic systems to accommodate the up to 40 full time employees because conveyance to an offsite treatment facility would be economically infeasible. However, there would be no commercial or industrial discharges to septic tanks.	
	Policy 253A: The County shall condition the approval of new development on verification that adequate wastewater treatment and export and/or reclamation capacity exists to serve the development.	The project would use onsite treatment or septic systems to accommodate the up to 40 full time employees because conveyance to an offsite treatment facility would be economically infeasible. However, there would be no commercial or industrial discharges to septic tanks.	Alameda County Senior Planner Bruce Jensen 510/670-6527
Storm Drainage and Flood Control	*Goal: To provide efficient, cost-effective, and environmentally sound storm drainage and flood control facilities.*		
	Policy 258: The County shall regulate new development on a case-by-case basis to ensure that, when appropriate, project storm drainage facilities shall be designed so that peak rate flow of storm water from new development will not exceed the rate of runoff from the site in its undeveloped state.	Project will design storm drainage facilities such that peak flows will not exceed the current rate of runoff.	Alameda County Senior Planner Bruce Jensen 510/670-6527
	Policy 260: The County shall encourage use of natural or nonstructural storm water drainage systems to preserve and enhance the natural features of a site.	The project would use an existing detention pond to store water, such that the existing natural stormwater drainage system will be adequate to convey flows.	

8.14.8.1 Federal

CWA authorizes USEPA to regulate discharges of wastewater and stormwater into surface waters by issuing NPDES permits setting pretreatment standards. CVRWQCBs implement these permits at the state level, but USEPA may retain jurisdiction at its discretion. The CWA's primary effect on EAEC is with regard to the control of soil erosion during construction and the need to prepare and execute site-specific erosion control plans and measures for the construction of each project element that will entail the physical disruption or displacement of surface soil. In addition, Section 404 of the CWA regulates wetland disturbance and provides guidance on crossing waterways. The U.S. Army Corps of Engineers administers Section 404 permits for fill.

8.14.8.2 State

State LORS applicable to this project include CEQA, CVRWQCB administration of stormwater permits, and CDFG administration of the streambed alteration-permitting program.

California Environmental Quality Act. CEQA requires that projects approved by state agencies be evaluated for their potential to cause adverse environmental impacts, and that impacts be mitigated to the extent feasible and applicable. The CEC meets the requirements of CEQA through the CEQA-equivalent AFC process.

State Water Resources Control Board and Central Valley Regional Water Quality Control Board. The Central Valley Regional Water Quality Control Board (CVRWQCB) requires a notice of intent to be filed prior to construction activities. SWPPPs must be prepared prior to filing both the Construction and General Industrial Stormwater NPDES permits. The SWRCB Water Quality Order No. 99-08-DWQ applies to construction activity NPDES stormwater permits for construction areas of greater than 5 acres. SWRCB Order 97-03-DWQ authorizes general industrial stormwater permits.

California Water Code Section 13550, 13551, 461 and SWRCB Resolution No. 75-58. These water code sections and policy statements encourage the conservation of water resources and the maximum reuse of wastewater, particularly in areas where water is in short supply.

Title 27 of the California Code of Regulations. Title 27 defines the various types of waste that could be discharged to land and defines the requirements for design, operation and permitting of waste discharges to land.

Title 22 of the California Code of Regulations. Title 22 addresses the use of recycled water; in particular Section 60306 sets forth the criteria for the use of recycled water for cooling. Such cooling water is defined as disinfected tertiary recycled water in Section 60401.230.

Fish and Game Code Section 1601 Streambed Alteration Agreement. CDFG administers the Streambed Alteration Agreement, which is for actions that would disturb bed and banks of surface streams.

Water Quality Certification. If a Section 404 permit for fill is required by U.S. Army Corps of Engineers, it must be accompanied by a Section 401 permit issued by CVRWQCB.

8.14.8.3 Local Policies

Local ordinances focus on flood control concerns, stormwater protection, and erosion control as well as use of reclaimed water for cooling. The East County Area Plan (ECAP) specifies policies listed in Table 8.14-9. The project conformance with these policies is also provided.

8.14.9 LORS Compliance Strategy

EAEC will comply with all applicable federal, state, and local LORS as described above. The stormwater permitting process, including the preparation of an SWPPP, must begin prior to any construction activities. The Notice of Intent and SWPPP must be filed prior to the start of construction activities. The general industrial stormwater NPDES permit must be filed prior to plant operations. A Notice of Intent must be filed 14 days prior to the beginning of industrial activity.

8.14.10 Permits Required

Water quality permits required for the project include the following:

- CVRWQCB Construction Activity NPDES Stormwater Permit, General Permit.
- CVRWQCB General Industrial NPDES Stormwater Permit, General Permit.
- Waste Discharge Report: For discharge of waste to land (evaporation ponds), issued by the CVRWQCB pursuant to Title 27.
- Streambed Alteration Agreement (Section 1601) for modifications to any creek, if required for construction of the water or gas pipelines.
- U.S. Army Corps of Engineers Wetlands fill permit Section 404 for fill in jurisdictional wetlands.
- Water Quality Certification Section 401, from the CVRWQCB, if 404 permit required.
- A State Department of Health Services (DHS) Title 22 Engineering Report for permitting recycled water use for cooling water.

A summary of required permits is provided in Table 8.14-9.

8.14.11 Agency Contacts

Agency contacts and required permits are listed in Table 8.14-9.

TABLE 8.14-9
Permits and Permitting Agencies for EAEC Water Resources

Permit	Agency
County Grading Permit	Alameda County Grading Department Gary Moore, Grading Supervisor 510/670-5402
County Stormwater Requirements	Alameda County Robert Hale 510/670-5563
Construction Activity NPDES Stormwater Permit	CVRWQCB Leo Sarmiento 916/255-3049
General Industrial NPDES Stormwater Permit	CVRWQCB Sue O'Connell 916/255-3000
Industrial Wastewater Discharge Requirements (WDR) Title 27	CVRWQCB Patricia Leary 916/255-3023
Streambed Alteration Agreement 1601	CDFG Warden Joe Powell 707/944-5500
Wetlands Permit 404 (and Water Quality Certification, Section 401)	ACOE Nancy Haley U.S. Army Corps of Engineers 916/557-7772

8.14.12 References

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Keeter, G.L. 1980. Chemical Analyses for Selected Wells in San Joaquin County and Part of Contra Costa County, California. USGS Open-File Report 80-420.

Modesto Irrigation District. 2000. Revised Initial Study and Proposed Negative Declaration for Electrical Service Extension, Mountain House New Community, San Joaquin and Alameda Counties, CA. November 14.

Technical Paper 40, Rainfall Frequency Atlas of the United States, for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years," US Dept. of Commerce, Weather Bureau, May 1961, Reprinted 1963.

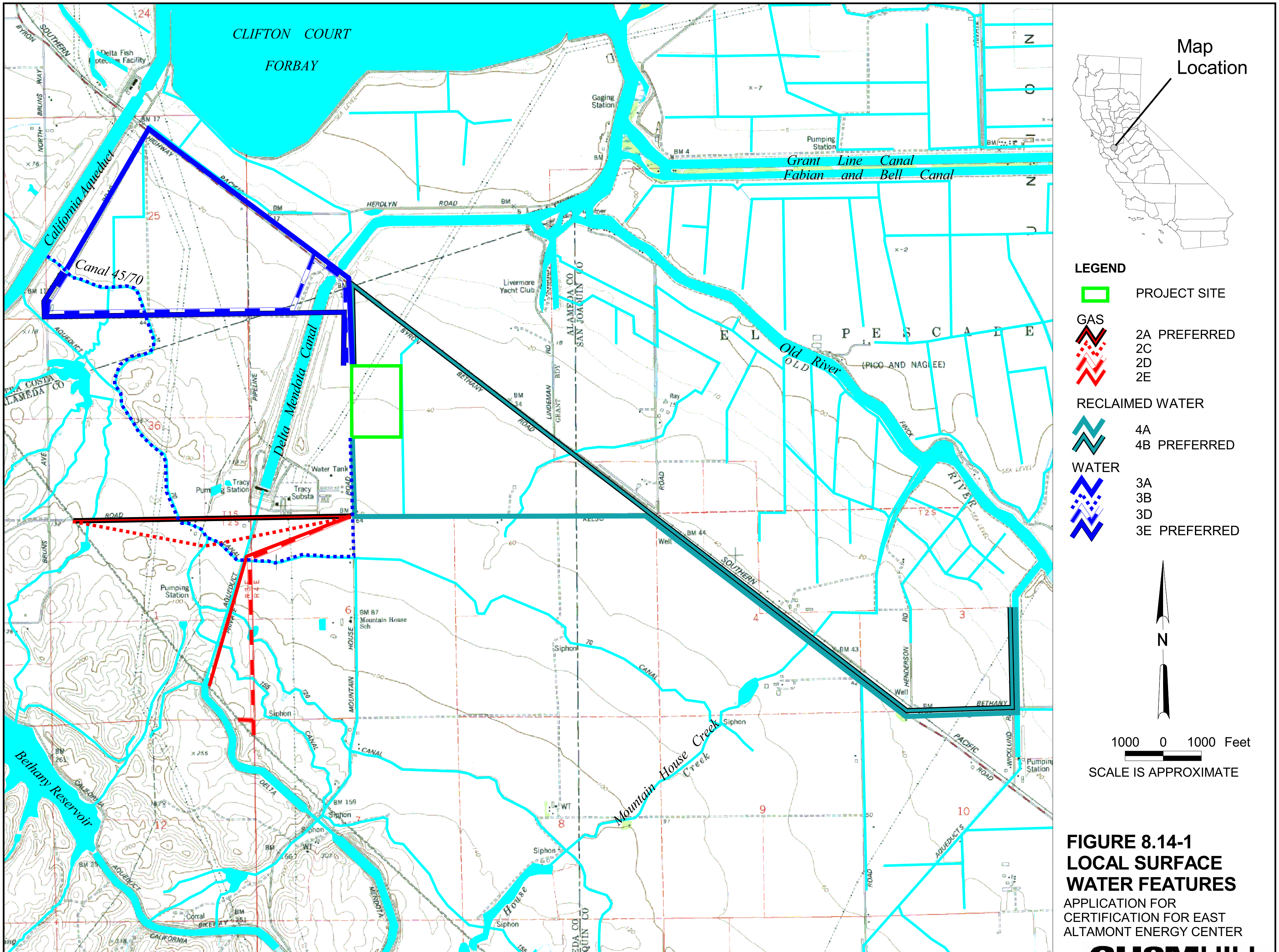


FIGURE 8.14-1
LOCAL SURFACE WATER FEATURES

APPLICATION FOR CERTIFICATION FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL

CH2M Hill RDD ArcView Project File \\Thor\Cart1\\THOR\Cart1\rddgis\east_alt\east_alt.apr fig8_14_1.pdf 5:02 p.m. 03-14-2001

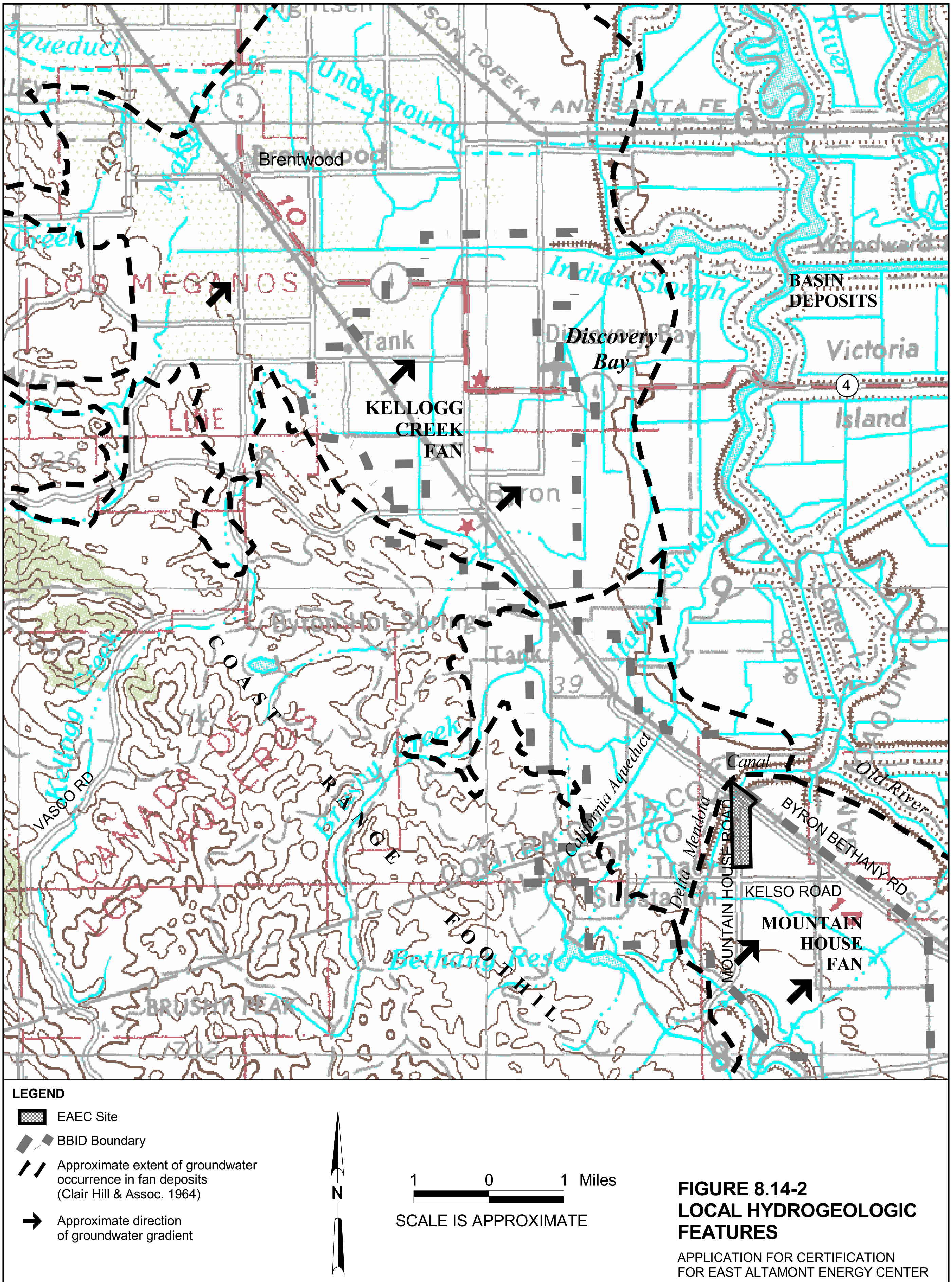
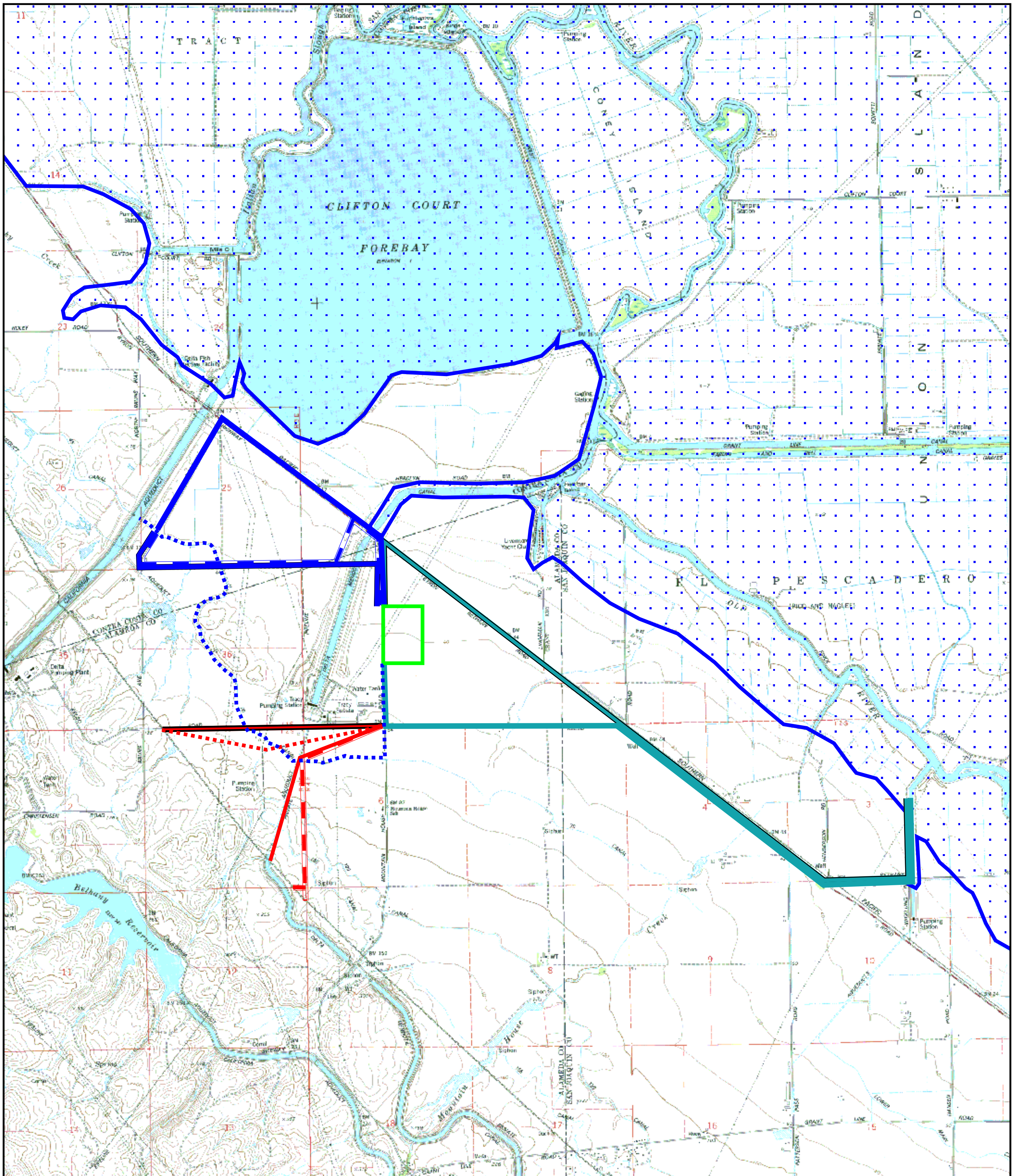


FIGURE 8.14-2
LOCAL HYDROGEOLOGIC FEATURES

APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL



LEGEND

PROJECT SITE

100 YEAR FLOOD ZONE

N

1 0 1 Miles

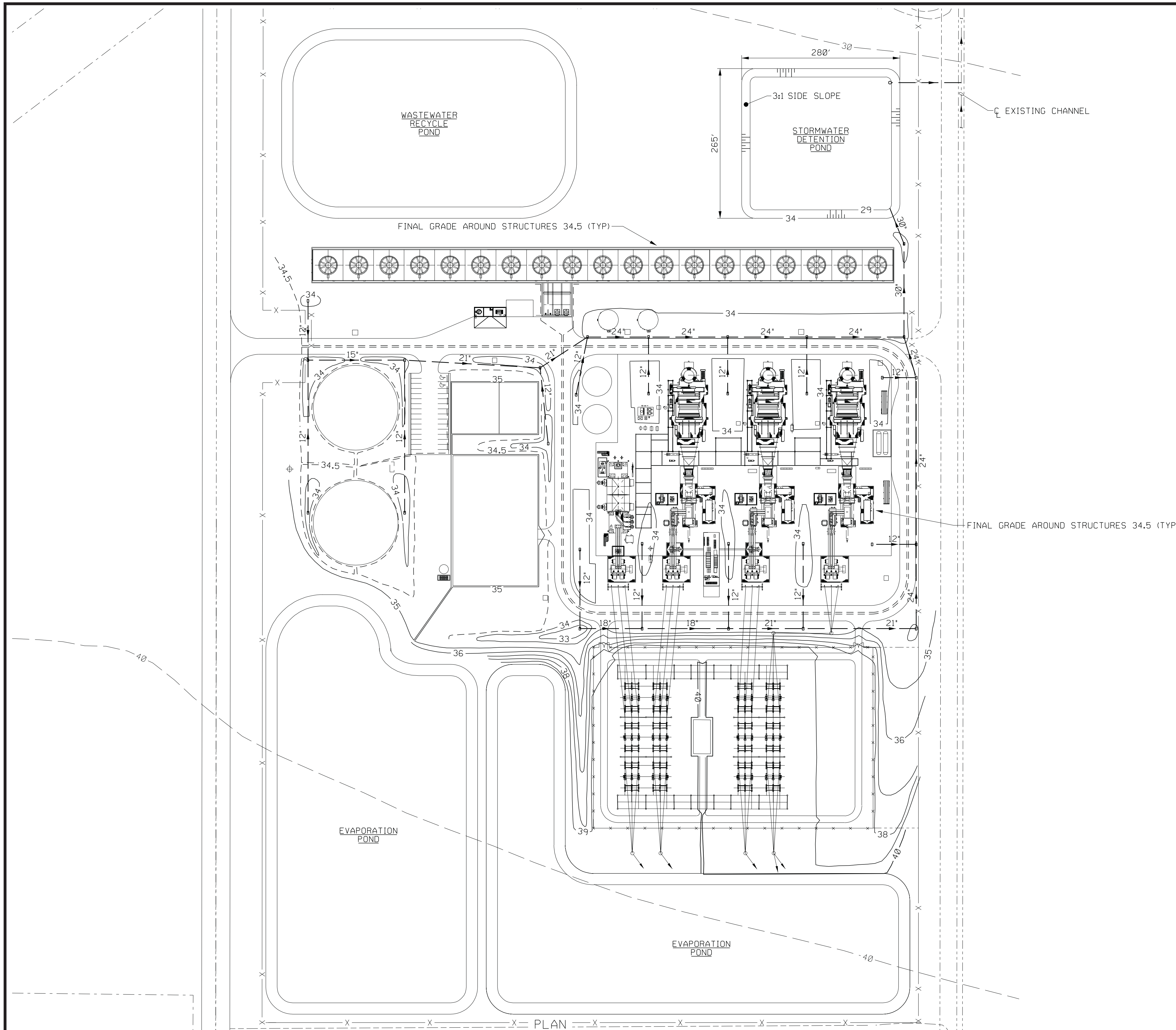
SCALE IS APPROXIMATE

SOURCE: FLOOD INSURANCE RATE MAP 1988

FIGURE 8.14-3
100 YEAR FLOOD MAP

APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL



LEGEND

— — 30 — —	EXISTING GRADE CONTOUR
35 / 34.5	FINAL GRADE CONTOUR
24"	STORMWATER DRAINAGE PIPE
▫	INLET

COVERAGE AREAS (ACRES)

TOTAL ACRES	174 ±
PROPOSED DEVELOPED ACRES	55.00
IMPERVIOUS	13.35
COOLING TOWER AREA	1.57
GRAVEL	14.10
STORMWATER POND	1.70
WASTE STORAGE POND	3.98
EVAPORATION POND (WEST)	5.82
EVAPORATION POND (EAST)	5.51
LANDSCAPING/GRASS (SITE AREA)	9.99
RETURN TO AGRICULTURE (LAYDOWN AREA)	22.00
BALANCE OF SITE (AGRICULTURE/GRASS)	97.0

FIGURE 8.14-4
EAEC PROPOSED DRAINAGE FACILITIES
APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL

3271_10 (3/15/01)

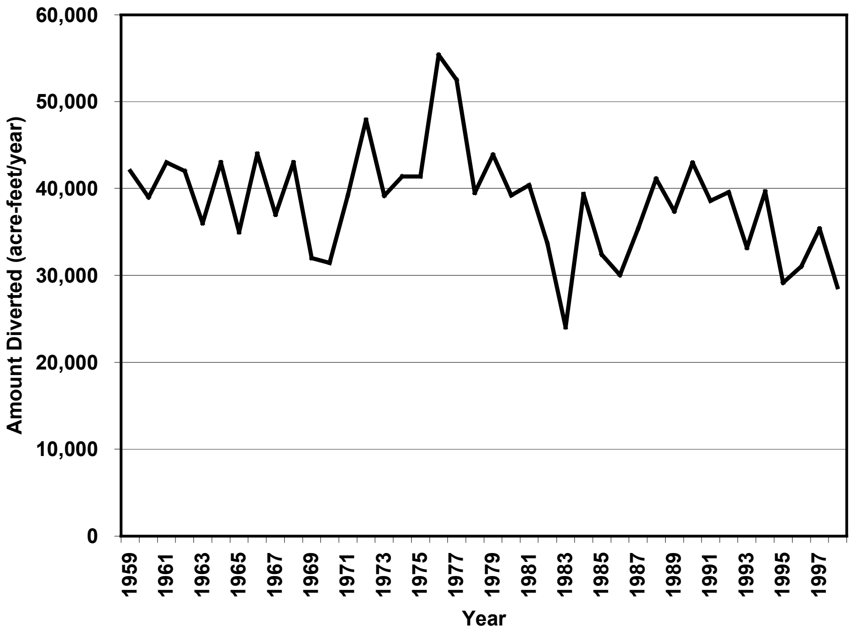


FIGURE 8.14-5
Historical BBID Diversions

8.15 Geologic Hazards and Resources

This section evaluates the effect of geologic hazards and geologic resources that might be encountered in the vicinity of the EAEC project area. Section 8.15.1 describes the existing geologic environment in the project area and Section 8.15.2 describes the effects of the geological environment on the project. Section 8.15.3 presents mitigation measures that could be used to reduce impacts from geologic hazards. Section 8.15.4 presents LORS that apply to geologic impacts from the project. Section 8.15.5 presents a list of the involved agencies and contacts in those agencies. Section 8.15.6 describes the permits that will be required and the schedule for obtaining them. Section 8.15.7 presents the references used in preparation of this section.

8.15.1 Affected Environment

The EAEC site is located in the northeastern-most corner of Alameda County near the western edge of the San Joaquin Valley and near the border of the Coast Range and the Great Valley geomorphic provinces. The Coast Range is a series of valleys and mountains along the West Coast of California that extend from Oregon to the Santa Ynez River near Santa Barbara. The Great Valley is a 400-mile-long, northwest-southeast trending structural basin that extends along the center of the state from the Klamath Range in the north to the Tehachapi Mountains in the south. The proposed generating facility site is relatively flat (average elevation 50 feet) and is underlain by Quaternary alluvial deposits.

8.15.1.1 Regional Geology

The geology of the EAEC vicinity is complex, largely a result of the interaction of the strike-slip tectonics of the San Joaquin fault system and the compressional tectonics of the Coast Ranges. The Coast Ranges are composed of several parallel longitudinal ranges that trend northwest. These ranges have resulted from the folding and faulting of intra-basin sediments during Miocene to Pleistocene periods. The Diablo Range, west of the site, is an assemblage of anticlinal folds composed largely of Cretaceous-Jurassic age Franciscan Formation marine sedimentary rocks. Few streams flow easterly from the Diablo Range and drainage tends to be rapid and intermittent. These conditions favor the formation of alluvial fans.

8.15.1.2 Local Geology

The local geology is composed of alluvial fan deposits of Holocene age underlain by semi-consolidated to consolidated deposits of Pliocene-Pleistocene age. Figure 8.15-1 shows the geology within a 2-mile radius of the EAEC site. The structure and stratigraphy of the local area are discussed below.

Structure. The structural geology of the area is dominated by deformation associated with historical tectonic activity, the numerous faults in the region (discussed below), and the more recent (Quaternary) alluvial fan deposition off the Diablo Range.

Some landslides have occurred in the Diablo Range (Dibblee, 1972). These slides are localized, however, and have not been mapped in the vicinity of the EAEC site, which is more than 1 mile from the base of the mountains.

Stratigraphy. Several major units occur in the vicinity of the EAEC site. These are discussed below.

Quaternary Dos Palos Alluvial Deposits. These are flood basin deposits of Holocene age (0 to 10,000 years).

Quaternary Alluvial Fan Deposits. These are unconsolidated alluvial units deposited in fans from the adjacent mountains. Gravel, sand, silt, and clay units are highly variable in the subsurface; Holocene age (0 to 10,000 years).

Tulare Formation. The Tulare formation forms a narrow strip of valley-fill sediment along the west margin of the San Joaquin Valley. It is composed of semi-consolidated to consolidated deposits of clay, silt, sand, and gravel. The source of the sediment is the Franciscan Formation and Tertiary sediments of the Diablo Range. Within the formation lies the Corcoran Clay member, a blue diatomaceous clay that is widespread in the San Joaquin Valley and serves as a confining bed to groundwater; Pliocene to Pleistocene age (10,000 to 5 million years).

Fanglomerate Deposits. These are consolidated deposits consisting of conglomerate, sandstone, and siltstone; Miocene age (5 million to 25 million years).

San Pablo Group. This deposit consists of sandstone, mudstone, siltstone, and shale, with minor tuff and is marine in origin; Miocene age (5 million to 25 million years).

Panoche Formation. This deposit consists of sandstone, shale, siltstone, conglomerate lenses and is marine in origin; Cretaceous age (67 million to 140 million years).

Moreno Formation. This deposit is composed of organic shale, siltstone, and sandstone and is marine in origin; Cretaceous age (67 million to 140 million years).

Franciscan Complex. The Franciscan Complex is a Middle to Late Jurassic (150 million to 165 million years) assemblage consisting of distinct units of sandstone, shale, chert, greenstone (metamorphosed basalt), and serpentinite (shallow mantle ultramafic). The Franciscan represents a melange, produced by the tectonic fragmenting and mixing of a subduction zone (Norris and Webb, 1990). The stratigraphy of the Franciscan Complex is very complex and has not been highly differentiated for the purposes of this study because it is located adjacent to, but not at, the EAEC site.

8.15.1.3 Regional Seismicity

Regional seismicity at the EAEC site is primarily influenced by the right-lateral strike-slip of the San Joaquin Fault system and the compressional tectonics of the Coast Ranges/Sierran Block boundary zone. This boundary zone has been designated a "Special Seismic Source" where regional seismicity may be caused from deep-seated slip in which no surface faults exist or faults are concealed by alluvium or complex folding (Stein and Yeats, 1989). In addition to this special seismic source, many faults exist within the vicinity of the site; these faults are discussed in greater detail below.

Major Faults. Table 8.15-1 lists active (Holocene) and inferred faults within approximately 30 miles of the site. For each fault an estimate of the maximum credible earthquake (MCE) is listed based on California seismic hazard mapping (Mualchin, 1996) and the Working Group on Northern California Earthquake Potential (WGNCEP, 1996).

TABLE 8.15-1
Major Faults within 30 miles of the East Altamont Energy Center

Fault Name	Fault Length (miles)	Horizontal Distance and Compass Direction from EAEC Site to Fault Trace (miles)	Maximum Credible Earthquake (MCE) M_W
Calaveras	75	21-W	7.5
Coast Ranges Sierran Block	370	4-SW	7.0
Concord	12	24-NW	6.5
Greenville	45	9-SW	7.25
Hayward	60	27-W	7.5
Midland	12	6-N	Unknown
Midway-San Joaquin	45	3.5-SW	6.75
Pleasanton	3	19-SW	Unknown
Southampton	9	28-NW	6.25
Tracy (Stockton)	30	6-SE	Unknown
Vernallis	17	5-E	7.5
Verona	5	18-SW	6.0

See report text for data sources.

Figure 8.15-2 shows the principal faults in the region. Fault data have been obtained from The Geologic Map of the San Francisco–San Jose Quadrangle, California (1:250,000 scale) compiled by Jennings (1994), Mualchin (1996), Bortugno et al. (1991), Northern California Earthquake Data Center (NCEDC) (1998), and Campbell et al. (1995).

Below is a brief description of the active faults in the site region and the maximum intensity of earthquake that can be expected from the faults. The discussion below provides estimates of the potential force of an earthquake along the identified faults, but the actual impact that could occur at the EAEC site would be based on actual distance to the earthquake epicenter, magnitude of the earthquake, and response of the geologic units at the site to the earthquake.

Two scales are commonly used as a measure of earthquake intensity. The Richter scale (known technically as the "Richter local magnitude") is based on the largest amplitude of seismic waves as recorded on a Woodson-Anderson seismograph. Richter scale values use the symbol M_L. The "moment magnitude scale" (M_W) is currently favored by seismologists and is based on the seismic moment of the earthquake.

Calaveras Fault. The Calaveras fault is 75 miles long and is approximately 21 miles west of the EAEC site. The Calaveras Fault has been identified as a branch of the San Andreas Fault system, but is considered to be dormant (Norris and Webb, 1990). However, displacement along the fault has occurred during Holocene time (within last 10,000 years). The Calaveras fault has an MCE estimated to be Mw 7.5 (Mualchin, 1996).

Concord Fault. The Concord fault is 12 miles long and lies approximately 24 miles northwest of the site. Displacement along this fault has occurred in Historic time (within the last 200 years) and has been estimated to have a MCE of Mw 6.5 (Mualchin, 1996).

Coast Ranges Sierran Block. This thrust fault is located approximately 4 miles southwest of the site and extends from near Red Bluff in northern California to Buttonwillow, northwest of Bakersfield in the southern San Joaquin Valley. The MCE for the Coast Ranges Sierran Block is estimated to be M_W 7.0

Greenville Fault. The Greenville fault is 45 miles long and is located 19 miles northeast of the EAEC site at its closest point. The fault extends from Bear Valley to just north of the Livermore Valley. Displacement has occurred during Holocene time (within the last 10,000 years). The MCE for the Greenville Fault is estimated to be M_W 7.25 (Mualchin, 1996).

Hayward Fault. The Hayward fault is 62 miles long and is located 30 miles from the EAEC site at its closest point. The fault is considered to be the most likely source of the next major earthquake in the San Francisco Bay (WGNCEP, 1996). Although the fault has recently experienced a number of small seismic events, the last major earthquake on the Hayward fault was a Richter magnitude M_L 6.8 event in October 1868. The MCE for the Hayward Fault is estimated to be M_W 7.5 (Mualchin, 1996).

Midland. This fault underlies the sedimentary materials approximately 6 miles north of the site. Its regency of faulting is unknown and the MCE is unknown.

Midway-San Joaquin Fault. The Midway-San Joaquin fault is 45 miles long and is located approximately 12 miles southeast of the EAEC site at its closest point. The MCE for this fault is estimated to be M_W 6.75 (Mualchin, 1996).

Pleasanton Fault. The Pleasanton fault is located approximately 20 miles southwest of the EAEC site and is approximately 3 miles long. This relatively short fault has had displacement within Holocene time (within the last 10,000 years). No MCE has been established for this fault.

Southampton. The Southampton fault is a short fault with a length of approximately 9 miles. The fault is located approximately 28 miles northwest of the site and has a MCE of M_W 6.25

Tracy (Stockton) Fault. This fault is concealed beneath the sediments of the Delta. It is thought to extend across the valley beyond Stockton. It does not have an MCE estimate.

Vernalis Fault. The Vernalis fault lies approximately 5 miles east of the site and is approximately 17 miles long. Displacement along this fault has occurred within Holocene time (within the last 10,000 years). No MCE has been established for this fault.

Verona Fault. The Verona fault is another relatively short active fault 7 miles southwest of the EAEC site. This 5-mile-long fault has had displacement within Holocene time. No MCE has been established for this fault.

Historical Seismicity. Recent historical seismicity for the San Francisco Bay region is associated with the San Andreas, Hayward, Calaveras, and Greenville faults. Early settlers wrote the earliest records of earthquakes in this region in the 1800s. The Northern California Earthquake Data Center has compiled data for a total of 7,940 earthquakes. There have been approximately 12 recorded earthquakes of M_L 6.0 or greater in the San Francisco Bay region in recent history. Ground-shaking hazards are significant for earthquakes of this magnitude. The most recent seismic events in the vicinity of the site include the 1979 Coyote Lake earthquake, the 1984 Morgan Hill earthquake, and the 1989 Loma Prieta earthquake.

8.15.1.4 Geologic Hazards

The following subsections discuss the potential geologic hazards that might occur in the project area and are based on a literature search only. Additional information could be available pending review of a site-specific geotechnical report, if performed.

Surface Fault Rupture. No active faults were found to cross either the EAEC site or any of the linear facility corridors (Bortugno et al., 1991).

Earthquake Ground-Shaking. The most significant geologic hazard at the EAEC site is most likely strong ground-shaking due to an earthquake. Mualchin (1996) estimated that the ground-shaking of a magnitude 6.75 earthquake along the Midway-San Joaquin Fault would produce peak ground gravity (g) acceleration of up to 0.45g in the vicinity of the EAEC.

Liquefaction. During strong ground-shaking, loose, saturated, cohesionless soils can experience a temporary loss of shear strength. This phenomenon is known as liquefaction. Liquefaction of soils is dependent on grain size distribution, relative density of the soils, degree of saturation, and intensity and duration of the earthquake. The potential hazard associated with liquefaction is seismically induced settlement. Evidence of liquefaction has been reported in the vicinity, especially near creeks and rivers. The southeastern-most corner of Contra Costa County has been designated as having a "Generally High" liquefaction potential by the Contra Costa General Plan (Contra Costa County, 1996). Since the EAEC site is less than one mile from the county line, it is anticipated that similar conditions exist at the EAEC site.

Slope Stability. Slope instability depends on steepness of the slope, underlying geology, surface soil strength, and moisture in the soil. Significant excavating, grading, or fill work during construction might introduce slope stability hazards at either the EAEC site or along linear facility routes. Because the EAEC site itself is flat and more than 1 mile from the nearest mountain, and no significant excavation is planned during site construction, the potential for direct impact from landslides at the site is considered nonexistent.

Subsidence. Subsidence can be caused by natural phenomena during tectonic movement, consolidation, hydrocompaction, or rapid sedimentation. Subsidence can also result from human activities, such as withdrawal of water or hydrocarbons in the subsurface soils. No known subsidence problems exist in the project area.

Expansive Soils. Expansive soils shrink and swell with wetting and drying. The shrink-swell capacity of expansive soils can result in differential movement beneath foundations. Expansive soils may be present under both the linear facilities and the EAEC site.

Geologic Resources. The following geologic resources are found in vicinity of the EAEC site.

Sand, Gravel, and Rock Resources. There are no known sand and gravel quarries close to the project site. The closest operating sand and gravel mining operations are approximately 15 to 20 miles west near Fremont and Pleasanton (Alameda County, 1994).

Clay. Clay mining historically occurred near Corral Hollow located approximately 12 miles south of the EAEC site, but is no longer economically feasible (Alameda County, 1994).

8.15.2 Environmental Impacts

8.15.2.1 Generating Facility

Geologic Hazards. Ground-shaking presents the most significant geologic hazard to the proposed EAEC generating facility and linear facilities. The potential for shrink-swell behavior in soils beneath the EAEC site and linear facilities may also be present. Mitigation measures proposed in Section 8.15.3 should be implemented in the design of the facilities to reduce risk associated with these hazards. Table 8.15-2 summarizes the geologic hazards associated with the EAEC site and linear facilities.

TABLE 8.15-2
Summary of Potential Geologic Hazards

Project Component	Area of Potential Concern	Geologic Hazards of Potential Concern
Proposed Generating Facility Site (up to 55 Acres)	Entire site	Seismic ground-shaking; liquefaction; shrink-swell
Electric Transmission Line	Entire route	Seismic ground-shaking; liquefaction; shrink-swell
Offsite Natural Gas Pipelines	Entire route	Seismic ground-shaking; liquefaction; shrink-swell
Water and Other Pipe Lines	Entire route	Seismic ground-shaking; slope instability; liquefaction; shrink-swell

Geologic Conditions and Topography. Construction will require minor grading and excavation, thereby altering the terrain of the EAEC site. Impacts to the geologic conditions involve dust generation, changes in drainage, cuts, and fills. Since the site is generally level, site grading is not expected to adversely impact the geologic environment.

8.15.2.2 Linear Facilities

Linear facilities associated with the EAEC site include electricity transmission, natural gas, water, and recycled water lines. These linear facilities are shown on Figure 2.1-1 and each is discussed below. The geologic hazards associated with the linear facilities are summarized in Table 8.15-2.

Electric Transmission Line. Seismically induced ground-shaking, liquefaction, and possible high shrink-swell potential all present potentially significant hazards to the proposed 230-kV transmission line route. With implementation of the mitigation measures proposed in Section 8.15.3, the hazards will be reduced to acceptable levels.

Natural Gas Supply Line. Seismically induced ground-shaking, liquefaction, and possible high shrink-swell potential all present potentially significant hazards to the proposed natural gas pipeline route. With implementation of the mitigation measures proposed in Section 8.15.3, the hazards will be reduced to acceptable levels.

Water and Other Lines. The cooling tower water supply and discharge lines, potable water supply lines, and storm drain are subject to potentially significant ground-shaking, liquefaction, slope instability, and shrink-swell hazards. With implementation of the mitigation measures proposed in Section 8.15.3, the hazards will be reduced to acceptable levels.

8.15.2.3 Geologic Resources of Recreational, Commercial, and Scientific Value

The project site is relatively flat and is primarily composed of recent alluvial sediments of little recreational value. Sand and gravel deposits are one of the most valuable resources of Alameda County and are present in the vicinity of the project site. However, these resources are not exploited at this time because they are not economically feasible (Alameda County, 1994). Most of the mining that does occur in the county occurs well west of the site in the Livermore Valley area. The EAEC site would not affect the use of these resources. In addition, there are no known geologic resources that provide a significant scientific value in the vicinity of the site.

8.15.3 Mitigation Measures

The following subsections describe mitigation measures that could be used to reduce impacts from geologic hazards.

8.15.3.1 Surface Faulting Rupture

No active faults were noted to cross the EAEC site or any of the linear facility corridors (Bortugno et al., 1991). Therefore, no mitigation measure is required to reduce the hazard from surface faulting rupture.

8.15.3.2 Ground-shaking

The EAEC generating facility and linear facilities will need to be designed and constructed to withstand strong earthquake shaking as specified in the 1997 Uniform Building Code (UBC) for Seismic Zone 4.

8.15.3.3 Liquefaction

Given the shallow depth of groundwater, liquefaction is a potential hazard at the EAEC site and linear facility routes. Liquefaction can be mitigated in a similar fashion to ground-shaking where facilities need to be designed and constructed as specified in the UBC.

8.15.3.4 Subsidence

No subsidence is known to exist in the project area. No mitigation measures are anticipated.

8.15.3.5 Expansive Soils

Expansive soils may be present under both the linear facilities and the EAEC site. Expansive soils can be mitigated by either removing the soil and back-filling with non-expansive soil, instituting a chemical stabilization of the soil, or by constructing a foundation treatment that resists uplift of the expansive soil. Site-specific conditions will be evaluated during facility planning/construction to determine the most appropriate mitigation measure that may be required.

8.15.4 LORS Compliance

Federal and state laws, ordinances, regulations, and standards applicable to geologic resources and hazards are discussed in Table 8.15-3. In addition to the laws, local planning policies from the East County Area Plan (Alameda County Planning Department, 1994) are also provided below:

Policy 286: The County, prior to approving new development, shall evaluate the degree to which the development could result in loss of lives or property, both within the development and beyond its boundaries, in the event of a natural disaster.

Policy 287: The County shall ensure that new major public facilities, including emergency response facilities (e.g., hospitals and fire stations), and water storage, wastewater treatment, and communications facilities, are sited in areas of low geologic risk.

Policy 291: The County shall require that buildings be designed and constructed to withstand ground-shaking forces or a minor earthquake without damage, of a moderate earthquake without structural damage, and of a major earthquake without collapse of the structure. The County shall require that critical facilities and structures (e.g., hospitals, emergency operations centers) be designed and constructed to remain standing and functional following an earthquake.

As noted in Section 8.15.3, the project will be designed and built to meet the applicable geologic and seismic hazards of the area. The project will be consistent with the County policies.

TABLE 8.15-3
Laws, Ordinances, Regulations, and Standards Applicable to EAEC Geologic Hazards and Resources

Agency	Applicable Code	Geologic Specific Criteria
Federal LORS	Uniform Building Code	Specifies criteria for seismic design and load-bearing capacity
State LORS	California Building Code	Specifies criteria for seismic design and load-bearing capacity

8.15.5 Involved Agencies and Agency Contacts

Several agencies are involved with geologic hazards and resources. These include RWQCB – Central Valley Division, the California Division of Mines and Geology (CDMG), and the County of Alameda. The agency contacts are shown in Table 8.15-4.

TABLE 8.15-4
Agency Contacts for EAEC Geologic Hazards and Resources

Agency	Contact	Title	Address	Telephone
RWQCB – Central Valley Division	Mark R. Bradley	Sr. WRC Engineer	3443 Routier Road, Suite A Sacramento, CA	916/255-3000
California Division of Mines and Geology	Jim Davis	State Geologist	801 K Street Sacramento, CA	916/445-1923
Alameda County	Andy Cho	County Geologist	399 Elmhurst, Room 141, Hayward, CA	510/670-6451

8.15.6 Permits Required and Permit Schedule

A construction permit is required for and will be obtained from the County of Alameda prior to commencement of construction. Approximately 4 to 6 weeks will be required to obtain the necessary permits.

8.15.7 References

Alameda County Planning Department. 1994. Conservation Element of the East Alameda County General Plan.

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Jennings, C. W. 1994. Fault Activity Map of California and Adjacent Areas. California Division of Mines and Geology. California Geologic Data Map Series, Map No. 6. 1:750,000 scale.

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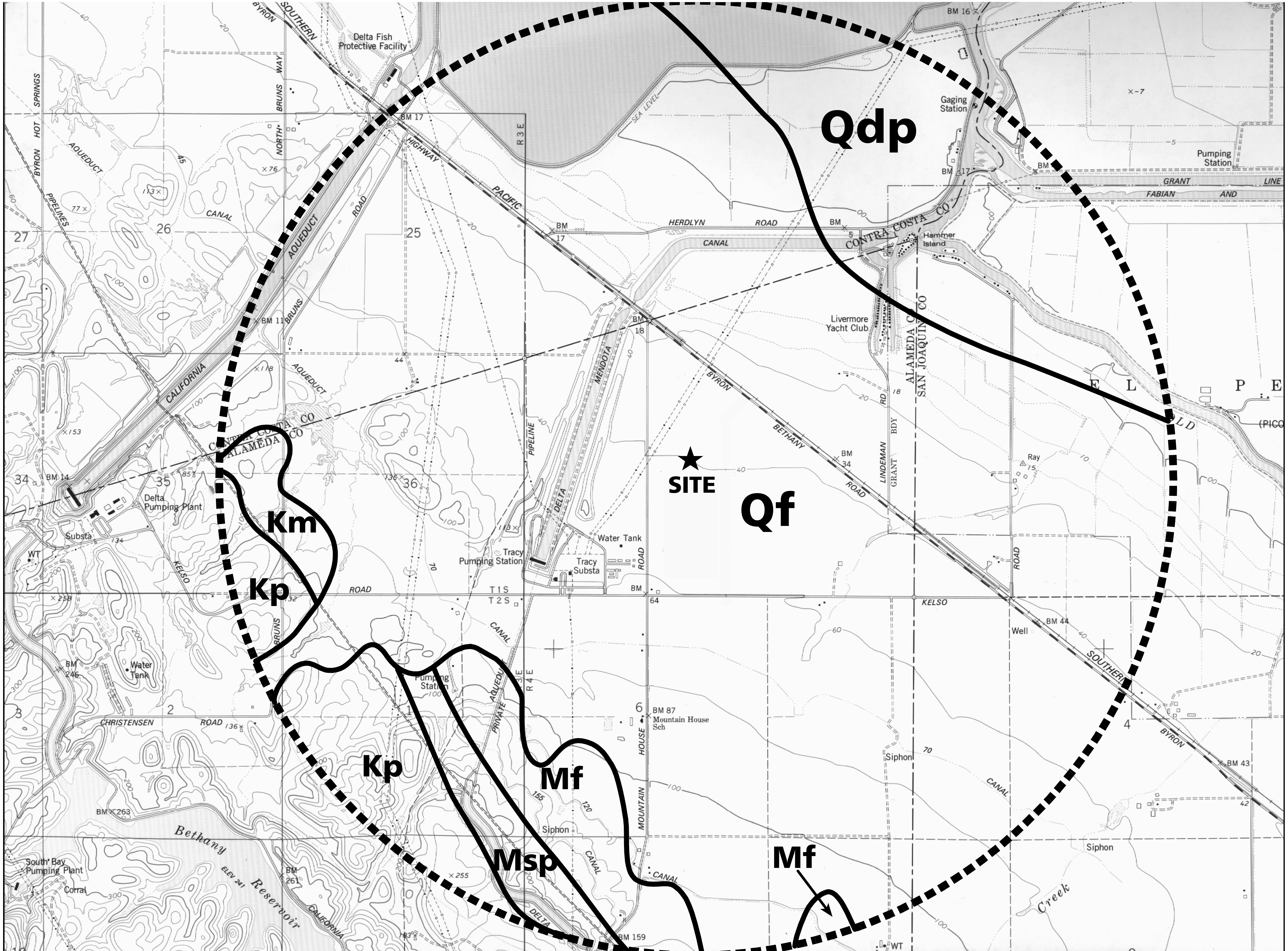
Working Group on Northern California Earthquake Potential (WGNCEP). 1996. Database of Potential Sources for Earthquakes Larger than Magnitude 6 in Northern California. U.S. Geological Survey. Open-File Report 96-705. 40 pp.

Working Group on California Earthquake Probabilities (WGCEP). 1990. Probabilities of Large Earthquakes in the San Francisco Bay Region, California. U.S. Geological Survey. Circular 1053. 51 pp.



LEGEND
Qdp: Dos Palos Alluvium
Qf: Alluvial fan deposits
Mf: Fanglomerate deposits
Msp: San Pablo Group
Kp: Panoche Formation
Km: Moreno Formation

Geologic Units Intrepreted from Geologic Map of the San Francisco-San Jose Quadrangle, CA. 1:250,000 Scale. 1991

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SCALE 1:24000

Figure 8.15-1
East Altamont Energy Center Area Geology

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FIGURE 8.15-2

EAST ALTAMONT ENERGY CENTER IN RELATION TO PRINCIPAL FAULT ZONES

APPLICATION FOR CERTIFICATION FOR
EAST ALTAMONT ENERGY CENTER

8.16 Paleontological Resources

Paleontological resources (fossils) are the remains or traces of prehistoric animals and plants. Fossils are important scientific and educational resources because of their use in (1) documenting the presence and evolutionary history of particular groups of now extinct organisms, (2) reconstructing the environments in which these organisms lived, (3) and in determining the relative ages of the strata in which they occur and of the geologic events that resulted in the deposition of the sediments that formed these strata and in their subsequent deformation.

This section of the AFC summarizes the potential environmental impacts on paleontological resources that may result from construction of the EAEC. Section 8.16.1 describes the existing environment that could be affected by the proposed EAEC project. Section 8.16.2 describes the potential impacts on paleontological resources resulting from construction and operation of the proposed project. The cumulative impacts to paleontological resources are discussed in Section 8.16.3. Proposed mitigation measures to reduce potential adverse impacts to paleontological resources are discussed in Section 8.16.4. Section 8.16.5 lists the federal and state LORS and the professional standards that protect paleontological resources. The involved agencies and agency contacts are provided in Section 8.16.6. Section 8.16.7 discusses the status of permits required and permit schedule. Section 8.16.8 lists the references used in preparing this document.

This paleontological resources inventory and impact assessment was prepared by Dr. Lanny H. Fisk, PhD, a registered geologist, senior paleontologist, and a principal of PaleoResource Consultants (PRC). It meets all requirements of the CEC (CEC, 2000) and the standard measures for mitigating adverse construction-related environmental impacts on paleontological resources established by the Society of Vertebrate Paleontology (SVP) (1991, 1995, 1996).

A paleontological resource can be significant if:

- It provides important information on the evolutionary trends among organisms, relating living organisms to extinct organisms.
- It provides important information regarding development of biological communities or interaction between botanical and zoological biota.
- It demonstrates unusual circumstances in biotic history.
- It is in short supply and in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and is not found in other geographic localities.

Under CEQA guidelines, (PRC 15064.5 (a) (2), public agencies must treat all historical and cultural resources as significant unless the preponderance of evidence demonstrates that they are not historically or culturally significant. In keeping with significance criteria of the SVP (1991), all vertebrate fossils are categorized as having significant scientific value.

8.16.1 Affected Environment

8.16.1.1 Geographic Location

The project site is located on the western edge of the San Joaquin Valley, along the easternmost foothills of the Coast Ranges, in west central California, about 8 miles northwest of Tracy. The San Joaquin Valley comprises roughly the southern two-thirds of the major north-northwest oriented structural trough called either the Central Valley (Jahns, 1954), Great Valley (Fenneman, 1931), Great Central Valley (Piper et al., 1939; Davis et al., 1957), or Valle Grande (Clark, 1929). The Central Valley Physiographic Province is located between the Sierra Nevada Physiographic Province on the east and the Coast Ranges Physiographic Province on the west. The general project area is bounded on the west by ridges that comprise the Diablo Range and on the east by the flood plain of the San Joaquin River. The proposed site for the EAEC generating facility is along the gently sloping east flank of the Diablo Range, which is the easternmost member of the Coast Ranges.

The proposed project and the associated electrical transmission lines, natural gas pipeline, and cooling water supply pipeline will be located in Alameda, San Joaquin, and Contra Costa counties. The project site lies in the northeastern corner of Alameda County, less than 1 mile south of the Contra Costa County line and less than 1 mile west of the San Joaquin County line. The proposed facilities will be within the U. S. Geological Survey (USGS) Clifton Court Forebay 7.5-minute Quadrangle (1:24,000). Most of the project area is rural farmland, but with increasing industrial and public utility development.

8.16.1.2 Regional Geologic Setting

The general geology of the San Joaquin Valley has been described in some detail by Hoots et al. (1954), Davis et al. (1957), Davis et al. (1959), Hoffman (1964), Croft and Wahrhaftig (1965), Hackel (1966), Marchand (1977), and Lettis (1982), among others. The information in these and other published reports form the basis of the following discussion. Individual publications are incorporated into the report and referenced where appropriate. For obtaining the older geological literature, the exhaustive compilation entitled "*Geological literature on the San Joaquin Valley of California*" by Maher et al. (1973) was particularly helpful.

The geology in the vicinity of the proposed project facilities has been mapped by Anderson and Pack (1915, 1:125,000 scale); Jenkins (1938, 1:500,000 scale); Huey (1948, 1:125,000 scale); Reiche (1950, approximately 1:60,000 scale); Snow, (1957, 1:24,000 scale); Rogers (1966, 1:250,000 scale); Schlocker (1970, 1:500,000 scale); Helley et al. (1972, 1:250,000 scale); Atwater (1982, 1:24,000 scale); Bartow (1985, 1:62,500 scale); and Wahrhaftig et al. (1993, 1:1,000,000 scale). The site-specific geology of the project is discussed in section 8.15. The aspects pertinent to paleontological resources are the types, distribution, and age of sediments immediately underlying the project area and their probability of producing fossils during project construction.

The San Joaquin Valley is a great structural depression between the tilted Sierra Nevada block on the east and the complexly folded and faulted Coast Ranges on the west. The Valley is filled with thick Mesozoic and Tertiary marine sediments covered by Quaternary alluvial sediments (Bailey, 1966).

On the west side of the San Joaquin Valley is a series of individual and coalescing alluvial fans, with their apices located where streams issue from the Coast Ranges. These low relief alluvial fans form a discontinuous belt between the dissected uplands of the Coast Range and the nearly flat surface of the valley bottom. They are composed of undeformed to slightly deformed alluvial deposits laid down in Quaternary time by the streams that drain the adjacent uplands of the Coast Range. Each alluvial fan consists of a mass of coarse to fine rock debris that splays outward from the mouth of its stream channel onto the valley floor as a fan-like deposit of well-sorted sand and gravel encased in a matrix of finer sediments, chiefly poorly sorted fine sand and silt deposited away from the stream channels on the alluvial plain. Smaller streams that drain the Coast Ranges foothill region have produced individual alluvial fans.

In the project vicinity, an alluvial fan has been created by rock debris deposited by Mountain House Creek and adjacent smaller, intermittent streams, all of which drain off the foothills of the Diablo Range. Geological materials composing the Mountain House Creek alluvial fan can be divided into two stratigraphic units: weakly cemented conglomerate, sandstone, and siltstone referred to the Plio-Pleistocene Tulare Formation exposed on the upper alluvial fan, and a slightly younger, unnamed and unconsolidated, sedimentary sequence that ranges from Pleistocene to Recent in age and overlies the Tulare Formation on the lower portion of the Mountain House Creek alluvial fan (unnamed Quaternary alluvium). Both of these rock units have yielded fossil remains at previously recorded fossil localities near the project site.

The ridges and hills to the southwest of the proposed site consist of steeply dipping, partially metamorphosed sedimentary rocks of the Great Valley Sequence and Franciscan Formation, which range from Jurassic to Cretaceous in age. The Quaternary alluvial deposits accumulated on the Mountain House Creek alluvial fan consist of medium- to fine-grained sediment eroded primarily from these Jurassic to Cretaceous rocks in the adjacent hills. The alluvial fan deposits grade east- and northeastward through gradually decreasing grain sizes from coarse pebble to cobble gravel at the Diablo Range foothills to clay-rich silt on the San Joaquin River flood plain. The poorly-sorted and lenticular gravel, sand, and silt that compose the Mountain House Creek alluvial fan have in the past produced abundant fossils, primarily of Pleistocene-age large land mammals such as mammoths, camels, bison, and horses. These paleontological resources are discussed below.

The limiting geologic ages of the two stratigraphic units composing the Mountain House Creek alluvial fan are still uncertain. New excavations have the potential to yield important new information, new fossils, or other field evidence, which may add to, confirm, or require modification of previous age interpretations. This new information also has the potential to provide a more complete and accurate understanding of the geologic history of the area.

8.16.1.3 Resource Inventory Methods

To develop a baseline paleontological resource inventory of the EAEC site and surrounding area and to assess the potential paleontological productivity of each stratigraphic unit present, the published as well as available unpublished geological and paleontological literature was reviewed; and stratigraphic and paleontologic inventories were compiled, synthesized, and evaluated (see below). These methods are consistent with CEC (2000) and SVP (1991, 1995) guidelines for assessing the importance of paleontological resources in areas of potential environmental effect. No subsurface exploration was conducted for this assessment, although stratigraphy was observed in numerous road cuts, quarry sites, pads leveled for wind generators, and canal banks during a site survey on 15 November 2000.

Geologic maps and reports covering the bedrock and surficial geology of the project site and vicinity were reviewed to determine the exposed and subsurface rock units, to assess the potential paleontological productivity of each rock unit, and to delineate their respective areal distribution in the project area. In addition, available aerial photographs of the area were examined to aid in determining the areal distribution of distinctive sediment and soil types.

The number and locations of previously recorded fossil sites from rock units exposed in and near the project site and the types of fossil remains each rock unit has produced were evaluated based on published and unpublished geological and paleontological literature (including previous environmental impact assessment documents and paleontological resource impact mitigation program final reports). The literature review was supplemented by archival searches conducted at the University of California Museum of Paleontology (UCMP) in Berkeley, California, for additional information regarding the occurrence of fossil sites and remains in and near the project site.

A field survey, which included a visual inspection of exposures of potentially fossiliferous strata in the project area, was conducted to document the presence of sediments suitable for containing fossil remains and the presence of any previously unrecorded fossil sites. The field survey was conducted on 15 November 2000 by Dr. Lanny H. Fisk, Ph.D., senior paleontologist with PRC.

8.16.1.4 Paleontological Resource Assessment Criteria

The paleontological importance or sensitivity (high, low, none, or undetermined) of each rock unit exposed in the project site or surrounding area is the measure most amenable to assessing the significance of paleontological resources because the areal distribution of each rock unit can be delineated on a topographic or geologic map. The paleontological importance of a stratigraphic unit reflects: (1) its potential paleontological productivity (and thus sensitivity), and (2) the scientific significance of the fossils it has produced.

This method of paleontological resources assessment is the most appropriate because discrete levels of paleontological importance can be delineated on a topographic or geologic map.

The potential paleontological productivity of a stratigraphic unit exposed in the project area is based on the abundance/densities of fossil specimens and/or previously recorded fossil sites in exposures of the unit in and near a project site. The underlying assumption of this assessment method is that exposures of a stratigraphic unit in a project site are most likely to yield fossil remains both in quantity and density similar to those previously recorded from that unit in and near the project site.

An individual fossil specimen is considered scientifically important if it is:

- Identifiable,
- Complete,

- Well preserved,
- Age diagnostic,
- Useful in paleoenvironmental reconstruction,
- A type or topotypic specimen,
- A member of a rare species,
- A species that is part of a diverse assemblage, and/or
- A skeletal element different from, or a specimen more complete than, those now available for that species. For example, identifiable land mammal fossils are considered scientifically important because of their potential use in providing accurate age determinations and paleoenvironmental reconstructions for the sediments in which they occur. Moreover, vertebrate remains are comparatively rare in the fossil record. Although fossil plants are usually considered of lesser importance because they are less helpful in age determination, they are actually more sensitive indicators of their environment and, thus, as sedentary organisms, more valuable than mobile mammals for paleoenvironmental reconstructions. For marine sediments, invertebrate fossils, including microfossils, are scientifically important for the same reasons that land mammal and/or land plant fossils are valuable in terrestrial deposits. The value or importance of different fossil groups varies depending on the age and depositional environment of the stratigraphic unit that contains the fossils.

The following tasks were completed to establish the paleontological importance and sensitivity of each stratigraphic unit exposed in or near the project site:

- The potential paleontological productivity of each rock unit was assessed based on the density of fossil remains and/or previously recorded and newly documented fossil sites it contains in and/or near the project site.
- The scientific importance of fossil remains recorded from a stratigraphic unit exposed in the project site was assessed.
- The paleontological importance of a rock unit was assessed, based on its documented and/or potential fossil content in the project site and surrounding area.

Categories of Sensitivity. In its standard guidelines for assessment and mitigation of adverse impacts to paleontological resources, the SVP (1995) established three categories of sensitivity for paleontological resources: high, low, and undetermined.

High Sensitivity. Stratigraphic units in which fossils have been previously found that have a high potential to produce additional fossils. In areas of high sensitivity, full-time monitoring is recommended during any project ground disturbance.

Low Sensitivity. Stratigraphic units that are not sedimentary in origin and that have not been known to produce fossils in the past. Monitoring is usually not recommended nor needed during project construction.

Undetermined Sensitivity. Stratigraphic units that have not had any previous paleontological resource surveys or fossil finds. After reconnaissance surveys, observation of exposed cuts, and possible subsurface testing, a qualified paleontologist can determine whether the stratigraphic unit should be categorized as having high, low, or undetermined sensitivity.

In keeping with the significance criteria of the SVP (1995), all vertebrate fossils are categorized as having significant scientific value and all stratigraphic units in which vertebrate fossils have previously been found have high sensitivity.

8.16.1.5 Resource Inventory Results

Stratigraphic Inventory. Although the interpretation is complex, it appears that the coarse-grained, proximal alluvial fan deposits in the project vicinity belong to the Tulare Formation and the overlying, undeformed layers of younger, unnamed Quaternary alluvium could be the equivalent of the Rancholabrean-age Modesto Formation.

The Tulare Formation includes those alluvial deposits along the western San Joaquin Valley margin that have been deformed or tilted at an angle to their original plane of deposition Woodring et al. (1940). At those places where the alluvium overlying the Tulare does so with angular unconformity, the contact between the two units is easily established. However, at many places along the Valley border, the dips increase westward so gradually that there is no apparent separation between the younger Quaternary alluvium and the Tulare Formation. In these areas, separation of the younger alluvium from the Tulare is virtually impossible because of their similar lithology.

Rogers (1966) mapped the area as “Pleistocene nonmarine sedimentary deposits.” Helley et al. (1972) mapped the area as Pleistocene “Older Alluvial Fan Deposits.” Atwater (1982) mapped only the lower portion of the Mountain House Creek alluvial fan, for which he used as a map unit “Alluvium of creeks from the Corral Hollow drainage to Brushy Creek” and listed the age as Holocene and / or Late Pleistocene. Bartow (1985) mapped the Mountain House Creek alluvial fan as Quaternary age “Alluvial Deposits, Undivided,” in which he included the Tulare Formation.

Fortunately, the difficulty in assigning a name to a stratigraphic unit does not affect its potential for producing significant paleontological resources. It only makes it more difficult to compare descriptions of fossil sites, which typically use either formally named stratigraphic units (formations and members) or North American Land Mammal Ages (Irvingtonian or Rancholabrean). The North American Land Mammal Age of the Tulare Formation is primarily, if not entirely, Irvingtonian and the unnamed Quaternary alluvium is probably entirely Rancholabrean.

The Tulare Formation is composed of interbedded and poorly sorted, brownish sandstone and siltstone with lesser amounts of pebble to cobble conglomerate. In places these materials are fairly well cemented, but in other nearby locations they are only slightly cemented. These beds are primarily fluvial deposits. Locally these sediments are well cemented with both calcareous and hematite cements. The Tulare Formation is believed to represent the depositional cycle between two major Coast Range orogenies dated as Late Pliocene and mid-Pleistocene by Taliaferro (1941, 1951), Davis et al. (1957, 1959), and others.

Site Geology. As mapped by Atwater (1982) and Bartow (1985), the proposed EAEC site is on unconsolidated, Holocene-age unnamed Quaternary alluvium, which forms a thin veneer overlying the Tulare Formation. These older sediments may be encountered in deeper excavations at the project site, including borings for concrete piles.

Tulare Formation. Late Pliocene to Pleistocene age Tulare Formation (Anderson, 1905) includes the oldest alluvium within the Mountain House Creek alluvial fan, but is not easily distinguished from younger alluvial deposits that overly the unit. The principal differences between the younger and older alluvial sediments are stratigraphic position, degree of consolidation, topographic expression, attitude (tilted versus flat-lying), and fossil content. According to Savage (1951), sediments in the San Francisco Bay area containing the latest Pleistocene and Holocene fossil faunas can often be distinguished from the older Pleistocene sediments by their relatively flat-lying attitude, while, in contrast, the older sediments containing Early Pleistocene (Irvingtonian) fossil faunas are often slightly tilted. This criterion has also been helpful to others in distinguishing older alluvium from younger alluvium (see for instance, Taliaferro, 1951; Davis et al., 1957; Hall, 1958; and Helley et al., 1972). According to Taliaferro (1941, 1951), the tilting of Early Pleistocene sediments is a direct result of “the mid-Pleistocene orogeny” in the Coast Ranges.

Unnamed Quaternary Alluvium. The unnamed Quaternary alluvium is lithologically indistinct from the underlying Tulare Formation, but can be distinguished from it by the degree of cementation and therefore topographic expression, amount of deformation, and age. The Tulare Formation is believed to be Late Pliocene to Mid-Pleistocene in age, while the unnamed Quaternary alluvium is probably Late Pleistocene to Holocene in age. Strata comprising the Tulare Formation have been deformed by frequent tectonic activity and can often be recognized from the overlying Quaternary alluvium by their non-flat-lying attitude. Because of its greater cementation, the older stratigraphic unit also often has a distinct topographic expression. As Late Pleistocene uplift exposed parts of the Tulare-age deposits, streams cut below the Middle Pleistocene surface, leaving remnants preserved as topographic highs. The unnamed Quaternary alluvium, which is exposed at the proposed site of the EAEC, could overlie such older Pleistocene sediments at a shallow depth.

The simple, two-part subdivision of the alluvial sediments used in this report appears to be defensible not only on the basis of stratigraphic superposition, topographic expression, and the presence or absence of deformation, but also on the basis of fossil content. From his survey of vertebrate faunas from the non-marine Quaternary deposits of the San Francisco Bay region, Savage (1951) concluded that only two divisions could be recognized. He named the earlier Pleistocene fauna the Irvingtonian North American Land Mammal Age and the later Pleistocene and Holocene fauna the Rancholabrean North American Land Mammal Age. As used in this report, the older Tulare Formation is believed to be primarily, if not entirely, Irvingtonian in age and the younger unnamed Quaternary alluvium is believed to be probably entirely Rancholabrean in age.

Paleontological Resource Inventory. An inventory of the paleontologic resources of each rock unit exposed in or near the proposed project site is presented below and the paleontologic importance of these resources is assessed.

The literature review and UCMP archival search conducted for this inventory documented no previously recorded fossil sites as occurring within the project site or linear corridors.

However, a number of fossil sites occur near the proposed project site, and fossil remains were found at a previously unrecorded fossil site during the field survey of the proposed project site.

An abundance of Pleistocene and Holocene vertebrate fossils have been reported from sediments in the vicinity of the proposed EAEC, from sediments referable to both the Tulare Formation and the unnamed Quaternary alluvium. Reiche (1950) noted numerous discoveries made during construction of the Delta-Mendota Canal. Other specimens were discovered during construction of the California Aqueduct (Jefferson 1991a and b; UCMP records). Surveys of Quaternary land mammal fossils have been made by Merriam (1915 [a or b]), Stirton (1939, 1951), Savage (1951), Lundelius et al. (1983), and Jefferson (1991b), and surveys of Quaternary birds, reptiles, and amphibians have been made by Miller and DeMay (1953) and Jefferson (1991a). Mammalian fossils have been the most helpful in determining the relative age of the alluvial fan sedimentary deposits (Louderback, 1951; Savage 1951). Fossils from the Tulare Formation are Plio-Pleistocene in age. The mammals collected from this unit include mammoths, mastodons, horses, tapirs, camels, deer, elk, ground sloths, saber-tooth cats, dire wolves, coyotes, foxes, gophers, mice, and squirrels (Reiche, 1950; UCMP records). The mammalian inhabitants of the Late Pleistocene to Holocene alluvial fan included mammoths, horses, bison, and camels. The age of the Late Pleistocene to Holocene Rancholabrean faunas is based on the presence of *Bison* and by the presence of many mammalian species which are inhabitants of the same area today.

Tulare Formation. The Tulare Formation has yielded fossil remains at numerous sites in the San Joaquin Valley. These remains include algal stromatolites (vertically layered mat-like algal growths); diatoms; petrified wood; shells of snails and clams; and the bones and teeth of bony fishes, amphibians, turtles, lizards, snakes, birds, and a diversity of extinct land mammals, including moles, ground sloths, rabbits, squirrels, gophers, pocket mice, kangaroo rats, pack rats, deer mice, cotton rats, grasshopper mice, dogs, saber-tooth cats, horses, peccaries, camels, tapirs, and deer (Anderson and Pack, 1915; Arnold and Johnson, 1910; Davis et al., 1957, 1959; Foss and Blaisdell, 1968; Gester 1917; Hoots et al., 1954; Lander, 1993; Maher et al., 1975; Merriam, 1903, 1905, 1914, 1915 a and b, 1917; Porter 1943; Repenning, 1980; Reynolds, 1987, 1990; Stirton and VanderHoof, 1933; Taylor, 1966; Wood and Davis, 1959; Woodring et al., 1932).

Anderson and Pack (1915) also mentioned recycled fossils from older stratigraphic units and silicified wood in the Tulare Formation. During a field survey of prospective fossiliferous sediments on 15 November 2000, I found weathered bones of large land mammals, silicified wood, burrow casts, root casts, and recycled Cretaceous-age oysters in the Tulare Formation exposed along the Delta-Mendota Canal on the upper portion of the Mountain House Creek alluvial fan about three 3 miles south of the proposed site.

There are a number of previously recorded fossil sites in the Tulare Formation near the project site, many of which were uncovered by previous construction projects (Reiche, 1950; Jefferson, 1991a, 1991b; UCMP records). Jefferson (1991a and b) compiled a data base of California Late Pleistocene (Rancholabrean North American Land Mammal Age) vertebrate fossils from published records, technical reports, unpublished manuscripts, information from colleagues, and inspection of museum paleontological collections at over 40 public and private institutions. He listed 60 individual sites in Alameda County that yielded Rancholabrean vertebrate fossils, including numerous UCMP localities. Many of these fossil sites from east of the Coast Ranges would presumably be referable to the Tulare Formation as used in this report. Among the UCMP localities from near the project site, Jefferson (1991a and b) listed Rancholabrean and possibly Irvingtonian-age vertebrate fossil localities discovered during construction of the Delta-Mendota Canal.

Vertebrate fossils found during this construction project include extinct mammoths (both tusks and bones), mastodon (both tusks and bones), ground sloth, bison, tapir, camel, horse, and other large land mammals. All were collected from alluvial sediments considered to be Late Pleistocene (Reiche 1950) and probably equivalent to the upper Tulare Formation. These localities, now referred to as UCMP localities V-3823, 4727, 4728, 4802, 4803, 4809, 4816, 4818, 4819, 4859, 4860, 4861, and 4862, are located from 1.5 to 3.0 miles south of the proposed site for the EAEC on the upper portion of the Mountain House Creek alluvial fan. Additional UCMP localities (V-7079, 7080, and 70123) were found in Pleistocene Rancholabrean sediments during construction of the California Aqueduct at a location 3.5 miles south of the EAEC site. These UCMP localities produced fossils of fish, birds, and land mammals. Similar discoveries to those made during excavations for the Delta-Mendota Canal and California Aqueduct could be made during excavations for the proposed project because it would be constructed in the same stratigraphic units deposited at the same time on the same alluvial fan.

Based on the presence of fossil bison, University of California at Berkeley paleontology professor Don Savage (in Reiche, 1950) referred the Tulare Formation to the Rancholabrean North American Land Mammal Age that spans the boundary between Late Pleistocene and Early Holocene. However, Jefferson (1991b) has expressed the opinion that some Delta-Mendota Canal localities may be Irvingtonian in age.

In summary, sediments referable to the Tulare Formation have yielded an abundance of invertebrate, vertebrate, and plant fossils, including microfossils. Several previously recorded fossil localities are found near the proposed project site, including numerous sites 1.5 to 3.5 miles south of the site (Reiche, 1950; Jefferson, 1991a, 1991b; UCMP records). Because this unit has in the past produced significant fossils, the Tulare Formation is judged to be highly sensitive. Additional identifiable fossil remains recovered from the Tulare Formation during project construction would be scientifically important and significant.

Unnamed Quaternary Alluvium. Fossil remains of land mammals have also been found at localities in younger, unnamed Quaternary alluvium (Reiche, 1950; UCMP records; Jefferson, 1991b). When describing the geology of part of the Delta-Mendota Canal, Reiche (1950) noted that this unit contained bones of highly significant extinct vertebrates, including mammoth and rodents from a site less than one-half mile west-southwest of the proposed EAEC site. Helley et al. (1972) also noted that sediments equivalent to the unnamed Quaternary alluvium locally contain concentrations of continental vertebrate and invertebrate fossils.

Although no previously reported fossils are known to directly underlie the proposed project site, the presence of a previously recorded fossil site in unnamed Quaternary alluvium within one-half mile of the proposed the Applicant project site suggests that there is a high potential for additional similar fossil remains to be uncovered by excavations at the proposed EAEC site. Therefore, the unnamed Quaternary alluvium has a high sensitivity for producing additional paleontological resources. Identifiable fossil remains recovered from sediments of the unnamed Quaternary alluvium during EAEC project construction would be scientifically important.

8.16.2 Environmental Consequences

Potential impacts on paleontological resources resulting from construction of the proposed project can be divided into construction-related impacts and operation-related impacts. Construction-related impacts to paleontological resources primarily involve terrain modification (excavations and drainage diversion measures). Paleontologic resources, including an undetermined number of fossil remains and unrecorded fossil sites; associated specimen data and corresponding geologic and geographic site data; and the fossil-bearing strata, could be adversely affected by (i. e., would be sensitive to) ground disturbance and earth moving associated with construction of the project. Direct impacts would result from grading for temporary roads, and the generating facility site; trenching for pipelines; augering for concrete piling and the foundations for electrical towers or poles; and any other earth-moving activity that disturbed or buried previously undisturbed fossiliferous rock, making the rock and its paleontologic resources unavailable for future scientific investigation. The potential environmental effects from construction and operation of the project on paleontological resources are presented in the following subsections.

8.16.2.1 Potential Impacts from Project Construction

The proposed project site is located on unconsolidated, Late Pleistocene to Holocene-age alluvial deposits overlying at a shallow depth Late Pliocene to Mid-Pleistocene sediments of the Tulare Formation. The planned site filling and grading is not expected to result in significant adverse impacts to paleontological resources, as the ground surface in this area is already relatively flat and has already been disturbed by farming. Neither are the supporting facilities, such as temporary construction offices, laydown area, and parking areas, expected to have a significant adverse impact on paleontological resources, as they also will be located on ground previously disturbed and will involve no significant new ground disturbance.

However, deeper excavations at the plant site for foundations for the new turbines, trenching for the natural gas pipeline, the water supply pipeline, and electrical transmission line would disturb the unnamed Quaternary alluvium that contains Rancholabrean-age vertebrate fossils elsewhere. The excavation would also disturb older sediments of the underlying Tulare Formation that could contain Irvingtonian-age vertebrate fossils. Thus, deep excavations could have adverse impacts on significant paleontological resources in either or both stratigraphic units.

8.16.2.2 Potential Impacts from Project Operation

No impacts on paleontological resources are expected to occur from the continuing operation of the project or any of its related facilities.

8.16.3 Cumulative Impacts

If the project were to encounter paleontological finds during construction, the potential cumulative effect would be low, as long as mitigative measures were implemented to recover the resources. The mitigative measures proposed (Section 8.16.4) would effectively recover the value to science of significant fossils recovered.

8.16.4 Mitigation Measures

This section describes the potential mitigation measures that will be implemented to reduce potential adverse impacts to significant paleontological resources resulting from project construction. Mitigation measures are necessary because of potential adverse impacts of project construction on significant paleontological resources within both the Tulare Formation and in the unnamed Quaternary alluvium. The proposed paleontologic resource impact mitigation program would reduce, to an insignificant level, the direct, indirect, and cumulative adverse environmental impacts on paleontologic resources that might result from project construction. The mitigation measures proposed below for the project are consistent with CEC environmental guidelines (CEC, 2000) and with SVP standard guidelines for mitigating adverse construction-related impacts on paleontologic resources (SVP 1991, 1995, 1996).

Prior to construction, a qualified paleontologist will be retained to both design and implement a monitoring and mitigation program during project-related earth-moving activities for deep excavation at the generating facility site, for deep boring for concrete piles and electrical transmission towers, and for construction of the water and natural gas pipelines. Prior to construction the paleontologist will conduct a limited field survey of exposures of sensitive stratigraphic units within the construction site that will be disturbed by earth-moving. Earth-moving construction activities will be monitored where this activity will disturb previously undisturbed sediment. Monitoring will not be conducted in areas where the ground has been previously disturbed or in areas where exposed sediment will be buried, but not otherwise disturbed.

The paleontological resource monitoring and mitigation program will include construction monitoring; emergency discovery procedures; sampling and data recovery, if needed; museum storage of any specimen and data recovered; preconstruction coordination; and reporting.

Prior to start of construction, construction personnel involved with earth-moving activities will be informed on the appearance of fossils and proper notification procedures. This worker training will be prepared and presented by a qualified paleontologist.

Implementation of these mitigation measures will reduce the potentially significant adverse environmental impact of ground disturbance and earth-moving on paleontological resources of the proposed project site to an insignificant level by allowing for the recovery of fossil remains and associated specimen data and corresponding geologic and geographic site data that otherwise might have been lost to earth-moving and to unauthorized fossil collecting.

With a well designed and implemented paleontological resource monitoring and mitigation plan, project construction could actually result in beneficial effects on paleontological resources through the possible recovery of fossil remains that would not have been exposed without project construction and, therefore, would not have been available for study. The recovery of fossil remains as part of project construction could help answer important questions regarding the geographic distribution, stratigraphic position, and age of fossiliferous sediments in the project area.

8.16.5 Laws, Ordinances, Regulations, and Standards

Paleontological resources are classified as non-renewable scientific resources and are protected by several federal and state statutes, most notably by the 1906 Federal Antiquities Act and other subsequent federal legislation and policies and by State of California's environmental regulations (CEQA, Section 15064.5). Professional standards for assessment and mitigation of adverse impacts on paleontological resources have been established by the SVP (1991, 1995, 1996). Design, construction, and operation of the proposed project, including transmission lines, pipelines, and ancillary facilities, will be conducted in accordance with LORS applicable to paleontological resources. Federal and state LORS applicable to paleontological resources are summarized in Table 8.16-1 and discussed briefly below, together with SVP professional standards.

TABLE 8.16-1
LORS Applicable to Paleontological Resources

Project LORS	Applicability	AFC Reference	Conformity
Antiquities Act of 1906	Protects paleontological resources on federal lands	Section 8.16.5	Yes
CEQA	Fossil remains may be encountered by earth-moving	Section 8.16.5	Yes
Public Resources Code Sections 5097.5/5097.9	Would apply only if some project land were acquired by the State of California		Yes

8.16.5.1 Federal LORS

Federal protection for significant paleontological resources would apply to the project if any construction or other related project impacts occurred on federally owned or managed lands. Federal legislative protection for paleontological resources stems from the Antiquities Act of 1906 (PL 59-209; 16 United States Code 431 *et seq.*; 34 Stat. 225), which calls for protection of historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest on federal land.

8.16.5.2 State LORS

The CEC environmental review process under the Warren-Alquist Act is considered functionally equivalent to that of the California Environmental Quality Act (CEQA; Public Resources Code Sections 15000 et seq.) with respect to paleontological resources. CEQA's Appendix G (Public Resources Code Sections 21000 et seq.) lists among its significant effects when a project will "*disrupt or adversely affect . . . a paleontological site except as part of a scientific study.*"

Other state requirements for paleontological resources management are in Public Resources Code Chapter 1.7, Section 5097.5, Archaeological, Paleontological, and Historical Sites. This statute specifies that state agencies may undertake surveys, excavations, or other operations as necessary on state lands to preserve or record paleontological resources. It would apply to the Applicant EAEC project only if the state or a state agency were to obtain ownership of project lands during the term of the project license.

8.16.5.3 County LORS

Alameda, Contra Costa, and San Joaquin counties do not have mitigation requirements that specifically address potential adverse impacts to paleontological resources.

8.16.5.4 Professional Standards.

The SVP, a national scientific organization of professional vertebrate paleontologists, has established standard guidelines (SVP, 1991, 1995, 1996) that outline acceptable professional practices in the conduct of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, and specimen preparation, identification, analysis, and curation. Most practicing professional paleontologists in the nation adhere closely to the SVP's assessment, mitigation, and monitoring requirements as specifically spelled out in its standard guidelines. Most California state regulatory agencies accept the SVP standard guidelines as a measure of professional practice.

8.16.6 Involved Agencies and Agency Contacts

There are no state or local agencies having specific jurisdiction over paleontological resources.

8.16.7 Permits Required and Permit Schedule

No state or county agency requires a paleontological collecting permit to allow for the recovery of fossil remains discovered as a result of construction-related earth moving on state or private land in a project site.

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Figure
8.16-1 Confidential Known Paleontological Resource Sites
Submitted as a Confidential Figure

9.0 Alternatives

A range of reasonable alternatives to the proposed EAEC are identified and evaluated in this section. The alternatives considered include the "No Project" alternative (that is, not developing a new power generation facility) as discussed in Section 9.1. Section 9.2 discusses the alternative site locations for constructing and operating EAEC. Alternatives to the linear facilities (electric, natural gas, and water) are presented in Section 9.3. Section 9.4 presents alternative combined cycle configurations to the combustion turbine and steam turbine arrangement currently proposed for EAEC. Alternative power generation technologies are discussed in Section 9.5. In addition, this section describes the site selection criteria used in determining the proposed location of EAEC. Electric transmission connection alternatives are addressed in Section 5.0 as well as in this section, alternative natural gas supply line routes are addressed here and in Section 6.0, and alternative waterline routes are discussed here and in Section 7.0. References used in preparation of this section are listed in Section 9.6.

9.1 No Project Alternative

9.1.1 Description

If the "No Project" alternative is selected, the Applicant would not receive authorization to construct and operate a new power generation facility. As a result, the proposed facility site would not be developed and would remain in agricultural production. Subsequently, energy that would have been produced by the proposed facility would need to be generated by another available source; common available sources include older power generation facilities that consume more natural gas and release larger quantities of air pollutants. In addition, under this alternative, California and the Western Interconnection will have less total generating capacity and therefore a less reliable and less competitive electric system.

The purpose of a merchant generating facility, such as EAEC, is to generate and sell electric power to deregulated markets. The California market was deregulated on March 31, 1998. To generate and sell power to a deregulated market, generating facilities need to be operated in a cost-effective manner and produce power at a cost that is acceptable to end users. With EAEC, the project owner, not ratepayers, will incur financial risks of project success or failure.

The "No Project" alternative is not considered feasible because it does not meet the objectives of a deregulated energy market, nor does it meet Calpine's business plans for the development of new merchant power generation facilities, or the general objective of replacing existing, less efficient generation facilities.

9.1.2 Potential Environmental Impacts

EAEC will produce electricity for the deregulated market while consuming less fuel and discharging fewer air emissions for each energy unit generated when compared to other existing, older fossil fuel generation facilities. This is a beneficial environmental impact.

Potential environmental impacts from the "No Project" alternative would result in greater fuel consumption and air pollution because new merchant generating facilities, including EAEC, would not be brought into operation to displace production from older, less efficient, higher air emissions power plants.

9.2 Proposed and Alternative Sites

Calpine has adopted a strategy of rapid growth in the power market by actively developing new power generation and by acquiring existing generation. This aggressive growth has led to Calpine's development of three wholly-owned projects and two jointly-owned projects in northern California. Calpine's strategic plan includes the development of power projects that result in minimal environmental consequences, and which are located near areas of high or increasing electrical demand. Transmission access to multiple markets is a marketing imperative for a merchant plant that bears financial risk. When Calpine began searching for what became the EAEC site, it was searching for a site to serve the Central Valley energy market principally and to have access to other markets as well. A second major goal was to minimize the length of linear facilities for gas, electricity, and water interconnection in order to minimize cost and impacts on the environment and human communities. Another aim was that the site should have minimal negative impact on electrical system congestion.

Potential sites at the eastern edge of Alameda County and the San Joaquin Valley were considered because of their proximity to a major PG&E gasline and two major substations, Tracy and Tesla, owned by Western and PG&E, respectively. The location of the proposed EAEC fulfills the first market goal because it provides access to the electrical markets in the MID and TID service areas, the Western system, and the ISO through the PG&E system. In addition, it fulfills the second goal in that no proposed linear facility exceeds 5 miles and most are about 2 miles in length. Although the System Impact Study (discussed in Section 5.0) is still in progress, preliminary studies indicate that required system improvements to accommodate EAEC will be minimal and that generation at this location provides needed voltage stability.

9.2.1 The Proposed Site

The proposed EAEC site is located at the eastern edge of Alameda County. The site covers approximately 55 acres of a 174-acre parcel. The site is under purchase option by a wholly-owned subsidiary of Calpine and was selected for the following reasons:

- The site is close to an existing transmission substation with access to PG&E, Western, MID, TID, and through PG&E, the ISO electrical markets. The proposed project site will allow power delivery without constructing significant new transmission lines, thereby causing minimal impact on the environment.
- Sufficient land (up to 55 acres plus a construction laydown area) was available.
- The site is served by a water purveyor with adequate water supply to support the project and is close to a potential source of recycled water.
- The site is close to the PG&E main gas pipeline.
- The site has an expected low impact on the environment.

- The site is located in a rural area with few residences nearby.
- The project uses would be consistent with other neighboring utility uses, such as the transmission substations.
- The site zoning is consistent for a generating facility.

9.2.2 Alternative Sites

Calpine also identified and assessed the suitability of several other properties for EAEC. As part of this assessment, the properties that were less than 25 acres in size were eliminated from further consideration because of their inability to support the project's space requirements.

Six other potential sites that have sufficient land area were identified. Several sites were also considered around the Tesla Substation. Figure 9-1 (figure located at the back of this section) identifies the location of the alternative sites that were evaluated during the site selection process.

9.2.2.1 Alternative Site Selection Criteria

The criteria developed to evaluate the alternative sites' suitability for EAEC correspond with the reasons the proposed site was selected. These criteria are as follows:

- Adequate size and shape to contain the proposed facilities and other site improvements
- Compatibility with local land use plans and zoning ordinances
- Existing land uses and the presence of site improvements
- Availability of water, electric, and natural gas interconnections
- Potential for less than significant environmental impacts (e.g., biological, cultural/paleontological, visual, noise, flooding, and seismic)
- Location of site in northeastern Alameda County area, or the western San Joaquin County area, or the southeastern Contra Costa County area with access to multiple markets

The alternative site locations, shown on Figure 9-1, were evaluated using the above criteria. The characteristics of each alternative site are presented in Table 9.2-1.

TABLE 9.2-1
Site Selection Criteria

Alternative Site	Site Size	Zoning Designation	Current Land Use/ Improvements
Site 1 (Arnaudo Brothers)	154 acres	Large Parcel Agriculture	Agricultural uses
Site 2 (Castello 1)	46 acres	Large Parcel Agriculture	Grazing uses
Site 3 (Castello 2)	37 acres	Large Parcel Agriculture	Agricultural uses
Site 4 (Steve Lee and J. Puang)	158 acres	Large Parcel Agriculture	Grazing and wind farms
Site 5 (Livermore Equity)	207 acres	Large Parcel Agriculture	Agricultural uses
Site 6 (north of Tesla Substation)	348.6 acres	Large Parcel Agriculture	Grazing and wind farms

9.2.2.2 Alternative Site Description and Feasibility

In this section, each of the alternative sites is described and analyzed based on its feasibility for use. Environmental considerations are presented in Section 9.2.2.3. Numerous sites were assessed in the proposed project's general area.

Several sites were identified in Contra Costa County on the northwest side of the California Aqueduct, but were rejected due to incompatibility with local land use plans. Additionally, these sites have the potential of interfering with the safe operation of the Byron Airport, which is located northwest of the proposed project site. Additionally, not all of these sites were located in the BBID service area, so water availability was also a concern. A few sites were also identified in western San Joaquin County, in the area of the new town of Mountain House, but were rejected due to incompatibility with local land use plans and visual impacts.

Site 1. Site 1 (Arnaudo Brothers) is located south of the proposed site, north of Grant Line Road. The site is a 154-acre parcel of relatively flat land with rising terrain to the southeast. The site is located in Alameda County and is zoned Agricultural.

The TID/MID 230-kV electrical line, which runs north-south, is located on the parcel. Natural gas delivery would require a pipeline less than 0.5 mile long for the proposed site. To supply water from the BBID, a line would have to be constructed. This new waterline would be approximately 2.5 miles longer than the line to the proposed site.

There are small communities along Grant Line Road directly south of this site, approximately 0.2 mile from the southern edge of Site 1. This site is closer to a larger number of residences than the proposed site or any other alternative site.

Site 2. Site 2 (Castello 1) is located south of the proposed project site, west of Site 1 (Arnaudo Brothers), situated between the California Aqueduct and the Delta-Mendota Canal. The site consists of approximately 46 acres of flat land, located within a small valley at the base of the foothills. A PG&E 500-kV transmission line intersects the site, which could make this site infeasible due to restrictions on siting structures near electrical transmission lines.

A PG&E 230-kV transmission line is located approximately 0.5 mile from the site. This site is not located in the BBID service area, and locating a water supply could be problematic. The natural gas pipeline would be less than 0.5 mile long and would pass under the Delta-Mendota Canal to connect to the PG&E pipeline.

The parcel is in Alameda County and is zoned Agricultural. As with Site 1, Site 2 is within approximately 2.0 miles of a small community, with the nearest residence being approximately 2,000 feet to the east.

Site 3. Site 3 (Castello 2) is located south of the proposed site, and is approximately 1,800 feet due west of the Mountain House School. The site is approximately 37 acres of flat land. A PG&E 230-kV electrical transmission line runs along the eastern border of Site 3, with a private aqueduct near the western border. The site is relatively flat with rising hills to the southwest. The nearest residence is approximately 1,000 feet to the west. Site 3 is located in Alameda County and is zoned Agricultural.

Site 3 would connect to the PG&E 230-kV transmission line or would require a 3,000-foot-long electrical transmission line to Western's Tracy substation. A 2-mile-long waterline would connect the site with the BBID water system. The natural gas supply line would be 1,500 feet long and would connect to PG&E's natural gasline located southwest of the site.

The electrical transmission line running along the east side of the parcel potentially reduces the usable size of the parcel due to setback restriction for electrical transmission lines.

Site 4. Site 4 (Steve Lee and J. Puang) is located southwest of the proposed site and consists of 158 acres. The site topography consists of several small mounts, gradually rising on the western side of the parcel. A PG&E natural gas compressor station is located due north. Wind generators are scattered in the hills to the southwest of the site. The PG&E natural gasline runs through the parcel at an angle, and Kelso Road runs along the northern edge of the site. The site is within 500 feet of several residences, with the closest resident less than 250 feet to the east. A set of PG&E 500-kV electrical transmission lines intersects the site. The site is located in Alameda County and is zoned Agricultural.

The site could connect electrically either to the PG&E 500-kV electrical line passing through the site, to the 230-kV line approximately 1,000 feet east of the site, or connect to the Tracy substation via a 2,000-foot-long transmission line. The site could interconnect with the PG&E natural gas onsite and would not require any offsite infrastructure. Connecting the site to the BBID water take-off point would require a 1.3-mile-long pipeline.

With electrical transmission and natural gasline intersecting this site, this site is somewhat constrained due to offset requirements associated with construction of facilities near these types of infrastructure. Furthermore, the elevated terrain located throughout the site further constrains the potential for locating a generating facility at this site.

Site 5. Site 5 (Livermore Equity) is located west of the proposed project site, on the west side and north of the Tracy Pumping Station. This site is a 207-acre parcel with undulating terrain. Several small hills are located on the western edge of the parcel and rise to 135 feet (above sea level). A PG&E 500-kV and a Western 230-kV electrical transmission line intersect the site on the western and eastern sides of the site. A majority of the site is located in Alameda County and is zoned Agricultural, with the northwestern portion of the site located in Contra Costa County.

The project would interconnect to the Tracy substation either by connecting to the Western 230-kV line on-site or by a 4,500-foot-long electrical transmission line. The PG&E natural gasline interconnection would require a 4,000-foot-long pipeline. The water supply line connecting the site to the BBID take-off point would require a 3,000-foot-long pipeline.

The project lies in an area identified by the Contra Costa County Airport Land Use Compatibility Plan (Shutt Moen Associates, 1999) as Zone B2. This zone designation requires any development to obtain an aviation approval from Contra Costa County, prohibits the aboveground storage of bulk hazardous materials, and an airspace review to be conducted for structures taller than 50 feet.

Site 6. Site 6 (North of Tesla substation) is a combination of two parcels consisting of parcels of 49.53-acres and 299.1 acres. The site is located north of the Tesla substation in rural eastern Alameda County. The site is currently grazing land with wind generators located on the western side of the site. A major PG&E natural gasline runs approximately 1,000 feet south of the site. The site is zoned large-parcel agricultural. Several residences are located approximately 0.5 mile from the site, along Midway Road.

The project would be electrically connected to the Tesla substation via a new approximately 1,000 foot transmission line. Natural gas would be provided from the PG&E natural gasline running through the Tesla substation via a new 1,000 foot pipeline. The electrical interconnection to the Tesla substation provides immediate market access only to PG&E and the ISO, but not the central San Joaquin Valley municipal districts of Modesto and Turlock.

The nearest source of water would be the City of Tracy's water service lines near the junction of I-580 and Patterson Pass Road, approximately 2 miles from the site. However, as presented below in the water resources analysis for this site, the City of Tracy does not believe it can provide either potable, groundwater, or recycled water in sufficient quantities to meet the project demand.

9.2.2.3 Environmental Considerations

In this section, the potential environmental impacts of the alternative sites are discussed relative to the proposed site. Potential environmental impacts from use of the proposed site are presented in each of the 16 environmental subsections of Section 8.0 of the AFC.

Air Quality. The type and quantity of air emissions from the proposed and alternative sites will be identical. However, the impacts on the human population and the environment will differ because of the location of residences and other human habitat in the vicinity of the sites and the terrain surrounding the alternative sites. Potential human impacts are discussed in Section 8.6, Public Health, and potential impacts on biota are discussed in Section 8.2, Biological Resources. In general, Sites 1, 2, 3, and 6 would have the potential for the largest air quality impact because of the proximity to existing residences and the Mountain House School. Sites 2, 3, 4, and 5 would have larger air quality impacts due to elevated terrain located adjacent to these sites, resulting in terrain-induced plume downwash.

Biological Resources. Types of biological resources in the area of the alternative sites are generally comparable to those identified at the proposed project site. These sites are currently in agricultural fields and are highly disturbed. However, Site 4 is located in an area consisting of annual grasslands, which is potential habitat for sensitive biological resources known to be in the area. Biological surveys have identified sensitive biological resources in the areas of the alternative sites. Specifically, San Joaquin Kit Fox were observed near Sites 1, 2, and 4, and Red-Legged Frogs at Site 3. A potential Kit Fox den was identified near Site 1 (see Figure 8-2). Additionally, Sites 2 and 4 are in the Red-Legged Frog Recovery "Core" Area. Site 5 is located in an area with annual grassland habitat and agricultural fields. Those portions of Site 5 containing annual grasslands could provide suitable habitat for sensitive biological resources and are also on the eastern edge of the Red-Legged Frog Recovery "Core" Area. Site 6 is in an area containing foothill grasslands. These lands are known to support vernal pools and wetlands. Such biological resources could likely support the listed fairy shrimp and tadpole shrimp. In addition, these water sources could also attract Red-Legged frogs and Foothill Yellow frogs. The site could also support habitat for the San Joaquin Kit Fox and Western Burrowing Owl. This site could also be a foraging area for protected raptor species.

Cultural Resources. The proposed and alternative project sites are located in areas with known cultural resources sites nearby. Therefore, the potential of impacting cultural resources is similar at the proposed site and alternative sites.

Land Use. The proposed and alternative sites are located in Alameda County, with the exception of a portion of Site 5, which is located in Contra Costa County. All of these sites are zoned large-parcel agricultural. Based on discussions with the Alameda County Planning Staff, the large-parcel agricultural zoning designation is consistent with the siting of a electrical generating facility and no zoning change is required. Therefore, the land uses impacts for the proposed site and the alternative sites are similar.

Noise. The proposed project site and alternative sites are sparsely populated, with Sites 1 and 2 being closest to a residential community. The proximity of Sites 1 and 2 to this larger population of sensitive receptors could result in significant noise impacts. The nearest sensitive receptor to Site 3 is a residence located approximately 1,000 feet to the east, with the Mountain House School located less than 2,000 feet from the site. Sites 4 and 5 are located within several hundred feet of the nearest sensitive receptor. Site 6 is located within 0.5 mile of the nearest sensitive receptors and noise impacts would be expected to be less than significant.

Public Health. Alternative Sites 1, 2, and 3 are significantly closer to a larger number of public receptors, the community south of Grant Line Road, and the Mountain House School. These sites would likely expose the public to higher public health impacts, although still less than significant impacts, than other sites.

Sites 2, 4, and 5 are located at the base of the foothills. These foothills can cause the results of the air dispersion modeling to predict higher ambient air quality impacts, including impacts associated with toxic air emissions. These higher ambient air quality impacts may result in higher public health impacts.

Site 6 is located within 0.5 mile of several residences and near elevated terrain. The elevated terrain could result in higher ambient air quality impacts, which could result in significant public health impacts.

Worker Health and Safety. EAEC has no impact on worker health and safety. Therefore, the worker health and safety impacts from the proposed site and alternative sites are equivalent.

Socioeconomics. Property taxes from EAEC, as well as any of the alternatives, will benefit Alameda County. All other socioeconomic impacts from the alternatives are believed to be the same as impacts from the proposed site.

Agriculture and Soils. With regard to agriculture and soils, the major differences between the proposed EAEC site and the alternative sites are their effects on prime agricultural land, erodibility of the land due to construction impacts, and revegetation of the site after construction. The proposed site is designated as "prime agricultural land," with a Rincon Clay Loam soil type.

Site 1. The predominant soil type at Site 1 is the Capay Clay, with a slight slope. The area is designated "prime agricultural land." The revegetation potential during and after construction is high, but soil erosion and sedimentation due to construction activities would be significant.

Site 2. The predominant soil type at Site 2 is the Linne Clay loam, and it is considered prime agricultural land. The revegetation potential during and after construction is high, but soil erosion and sedimentation due to construction activities would be significant.

Site 3. The predominant soil types at Site 3 are Rincon Clay (0 to 3 percent slopes) and Piper Sands (3 to 7 percent slopes). The area is designated "prime agricultural land." Development of this site will remove prime agricultural land from agricultural use. The revegetation potential during and after construction is high, but soil erosion and sedimentation due to construction activities would be significant.

Site 4. The soil types at Site 4 are designated as "prime agricultural land." Development of this site will remove prime agricultural land from agricultural use. The revegetation potential during and after construction is high; soil erosion and sedimentation due to construction activities would be minimal.

Site 5. Site 5 is designated as "unique farmland." Development of this site will remove this unique farmland from agricultural use. The revegetation potential during and after construction is high; soil erosion and sedimentation due to construction activities would be minimal.

Site 6. Site 6 is designated as "farmland of low importance." Development of this site will not significantly impact agricultural or soil resources. The potential for revegetation during and after construction is high.

Traffic and Transportation. The proposed site will require a new paved, 0.5-mile access road to be constructed from the site to Mountain House Road. The alternative sites would also require the construction of new access roads of varying lengths and are close to a rail line to allow for rail deliveries of heavy equipment. Traffic and transportation impacts would be comparable for the proposed project and the alternative sites.

Visual Resources. All of the alternative sites consist of parcels that are relatively undisturbed grazing or agricultural land located in rural areas. The potential for visual resources impacts associated with each of these sites varies depending on the relative visibility of the sites from roads and residences and the length and potential visibility of any new transmission lines that development of a generating facility on the site would require.

Site 1. Alternative Site 1 is highly visible from Grant Line Road because it is located on the inside of a bend in the road in an area where the landscape is open in character. A project on this site would have a moderately high potential to create impacts on visual resources because of the visibility of the facility in immediate proximity to a scenic rural road with a medium level of traffic. Furthermore, this site is located near a small community that would have a moderately high impact from the development of a plant at this location.

Site 2. Alternative Site 2 has low potential for creating impacts on visual resources. The site is tucked away at the end of a small valley, and the closest publicly accessible viewpoint is limited due to the restricted opening to the valley and isolated nature of the area. Two residences are located at the northern end of the valley opening. The transmission line visual impacts could be an issue at this site due to the potentially longer transmission line.

Site 3. Alternative Site 3 has a high potential for creating impacts on visual resources because it lies in immediate proximity to several rural residences and the Mountain House School that would have unobstructed views toward the facility. In addition, it has the potential to be highly visible from the scenic Mountain House Road, which lies 0.25 mile to the east. The transmission line that might be required to link a facility on this site to the existing Western substation would be visible in the viewshed of this rural road and of the nearby homes.

Site 4. Alternative Site 4 has low potential for creating impacts on visual resources. The site is tucked away between the Tracy Pumping Station, the PG&E 500-kV transmission lines, and the Delta Pumping Station. Few residences are located near the site. The transmission line visual impacts would be an issue at this site due to the probable longer transmission line.

Site 5. Alternative Site 5 has a moderate to low potential for creating impacts on visual resources. The site is northwest of the Tracy Pumping Station, and is situated between PG&E's 500-kV and 230-kV transmission lines. Few residences are located near the site.

Site 6. Site 6 is located in a rural area with scattered residences nearby (approximately 0.5 mile to the closest residence). However, the site is south of Patterson Pass Road, which is designated a Scenic Route by Alameda County. Motorists on this road will be able to view the site from Patterson Pass Road and a project at this site will potentially result in a low impact due to the existing electrical infrastructure in the area.

Hazardous Materials Handling. The same quantity of hazardous materials would be stored and used at the proposed site as at the alternative sites. Access to Site 2 is via 2-lane roads with curves and hills. The delivery distance for the ammonia is also longer for some of the alternative sites than the proposed site. A breach in the ammonia tank at the proposed site would have little to no effect on the population due to the design controls that would prevent offsite migration. However, Sites 1, 2, 3, and 6 are located near to residences; therefore, a release near one of those sites would pose a greater public concern.

Waste Management. The same quantity of waste will be generated at the proposed site as at the alternative sites. The environmental impact of waste disposal should not differ significantly between the proposed and alternative sites.

Water Resources. The source of water for EAEC consists of BBID raw water and recycled water for use in the cooling tower and process makeup, and BBID raw water for domestic use. The quantity of water required will be the same for all of the sites. However, Sites 1, 2, 3, and 6 will require the installation of longer water supply lines; Site 2 and Site 6 are not in the BBID service area.

A project at Site 6 would be required to obtain water from either the City of Tracy, San Joaquin County, or from onsite groundwater wells. The City of Tracy currently provides water service from groundwater and surface water sources. The city's potable water treatment plant has a maximum capacity of 25 million gallons per day, with a current demand of 21 million gallons per day, and is not capable of providing adequate water service to meet the water demands of the proposed project. Furthermore, the City has expressed concerns about the potential groundwater impacts associated with the use of groundwater for an electrical generation project in the area due to limits in groundwater resources in the area (Metcalf Preliminary Staff Assessment, 2000). Recycled water is not currently available in the area in sufficient quantities to service the proposed project's water demand. Furthermore, as a result of the passage of Measure D in Alameda County, future developments not already on the planning horizon may delay the availability of recycled water in the area for another 10 to 15 years.

The lack of water resources at Site 6 could be resolved by redesigning the project to replace the cooling tower with an air-cooled condenser. However, this project change would result in a significant reduction in electrical generation output, especially during the warm summer months when electrical demand in the central San Joaquin Valley is high.

Geologic Hazards and Resources. As described in Section 8.15, Geological Resources, the proposed site is potentially subject to seismically induced ground-shrinking, liquefaction, and has high shrink-swell potential. The alternative sites are also potentially subject to the same geologic hazards. Therefore, the geologic hazard impact from the proposed site and the alternative sites is equivalent.

Paleontological Resources. The proposed site and the alternative sites have the potential to adversely impact paleontological resources as a result of deep excavations in those areas where fill is not present and the site has not been disturbed by agriculture or other activities. Therefore, all sites have an equivalent potential for the presence of paleontological resources.

9.2.2.4 Selection of the Proposed EAEC Site

The primary reasons for selecting the proposed EAEC site were its environmental acceptability, its availability for purchase, its proximity to an existing electrical substation and a natural gas supply line, and its location within BBID. In addition, the site is reasonably far from highly populated areas and other sensitive areas. Nearby there is also a potential source of recycled water for facility cooling, domestic, and process makeup water. The proposed site is not as physically constrained as some of the alternative sites due to electrical transmission lines and natural gas pipelines crossing these sites. The alternative sites do not have all those characteristics, thereby making them less desirable for the location of EAEC.

Table 9.2-2 compares the potential environmental characteristics of the proposed EAEC site with Alternative Sites 1 through 6.

The proposed site location is superior to all of the alternative sites. In most cases, its impacts are the same as, or in some cases less than, the best alternative site. In addition, since the proposed site will require less development of linear facilities than most of its alternatives, the overall impact to the environment is likely to be lower.

9.3 Alternative Linear Facilities

Linear facilities required for EAEC include an electric transmission line, a natural gas supply line, and water supply lines (see Figures 2.1-1a and 1b). The proposed linear facilities are presented in Section 2.0, Project Description; Section 5.0, Electric Transmission; Section 6.0, Natural Gas Supply; and Section 7.0, Water Supply. In addition, the environmental impacts of the proposed linear facilities are discussed in several of the environmental sections, including Section 8.2, Biological Resources; Section 8.3, Cultural Resources;

TABLE 9.2-2
Comparison of Alternative Project Site Locations

Characteristic	Proposed Site	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Potential presence of T&E Species/ habitat	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Potential Cultural/ Archaeological Sensitivity	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe
Potential Land Use Incompatibility	No	No	No	No	No	Maybe	No
Proximity to Sensitive Noise Receptors	Close to Mountain House School	Near Residential Community	Scattered Residences	Close to Mountain House School	Scattered Residences	Scattered Residences	Scattered Residences
Risk to Humans from Deposition of Air Pollutants	Low	High	High	Moderate	Moderate	Moderate	Low
Removal of Prime Agricultural Land	Yes	Yes	Yes	Yes	Yes	Removal of Unique Farmland	No
Traffic & Transportation	Low	Low	Low	Low	Low	Low	Low
Potential Visual Sensitivity	Low	High	Low	High	Moderate	Low	Low
Risk to Humans from Offsite Migration of Hazardous Materials	Low	High	High	High	Low	Low	Low
Impact on Groundwater Supply	Low	Low	Low	Low	Low	Low	Uncertain
Potential Paleontological Sensitivity	Low-Moderate	Low-Moderate	Low-Moderate	Low-Moderate	Low-Moderate	Low-Moderate	Low-Moderate

Section 8.4, Land Use; Section 8.5, Noise; Section 8.9, Agriculture and Soils; Section 8.11, Visual Resources; and Section 8.16, Paleontological Resources. The potential environmental impacts of the alternatives to the proposed linear facilities are presented below.

9.3.1 Electric Transmission Lines

Due to the proximity of the proposed project site to the Tracy substation, only two alternative electrical transmission line routes were considered. The project will interconnect to the MID/TID 230-kV transmission line running along Kelso Road at the proposed project site's southern boundary. The TID/MID line will be routed into and out of the EAEC switchyard in a north/south orientation on separate transmission poles, separated from one another by approximately 260 feet. The two alternative transmission line routes will both be approximately 0.5 mile long, and will both exit the project site at the southern property line to join the existing 230-kV line south of Kelso Road.

9.3.1.1 Transmission Line Alternatives

Alternative 1a (Preferred). The preferred alternative consists of two electrical transmission lines that exit the property near the middle of the southern boundary. The two electrical lines are parallel to one another along the entire north/south orientation.

Alternative 1b. This alternative also consists of two electrical transmission lines that exit the property at the southern boundary, but exit along the eastern side of the property. In order to run along the eastern property line, both lines exit the switchyard at an angle before turning south, resulting in two additional transmission poles, compared to alternative 1a. Both alternatives would connect to the MID/TID 230 kV-line across Kelso Road from the property.

The potential impacts from these two lines are comparable, with the exception of impacts to agricultural and visual resources. Alternative 1b would result in transmission poles being spread over a larger portion of the agricultural field (compared to Alternative 1a) south of the project site and would result in increased difficulty in farming this land. Additionally, these additional poles required by Alternative 1b would result in increased visual impacts relative to Alternative 1a.

9.3.2 Natural Gas Supply Lines

Four alternative natural gas supply line routes were considered for the project.

9.3.2.1 Gasline Alternatives

Alternative 2a (Preferred). This route is a 1.4-mile pipeline that exits the project site to the south, following Kelso Road west to the Bethany Compressor Station just east of Bruns Road where it will interconnect into PG&E Line 401.

Alternative 2b. Alternative 2b was a gasline route that was considered during project scoping but determined to have potentially greater environmental impacts than those alternatives presented here. Therefore no further analysis of Alternative 2b is presented.

Alternative 2c. This alternative is a 1.4-mile pipeline that exits the project to the southwest and travels east following Kelso Road but runs south of Kelso Road in the agricultural fields to the Bethany Compressor Station.

Alternative 2d. This alternative is a 1.5-mile pipeline that exits the site to the southwest until it intersects the section line and turns south to connect to PG&E Line 401.

Alternative 2e. This alternative is a 1.2-mile gasline that exits the site to the southwest until it intersects the section line, then turns further south until it connects to PG&E Line 401.

9.3.2.2 Environmental Considerations

The expected environmental impacts of the alternative natural gas supply lines are presented below.

Air Quality. Except for emissions from construction equipment, the natural gas supply line has no impact on air quality. Therefore, the air quality impacts of the preferred transmission line and the alternative transmission lines are equivalent.

Biological Resources. Alternative 2a construction would be performed in the right-of-way along Kelso Road, minimizing potential impacts to biological resources. Alternatives 2c, 2d, and 2e would result in construction in agricultural fields with potential habitat for sensitive biological resources.

Cultural Resources. There are no known cultural resource sites located adjacent to the alternative routes.

Land Use. The alternative gas supply line routes primarily pass through county right-of-way land or agricultural land that is zoned Agricultural. Because the preferred gasline route passes through land with the same uses and zoning designations as the alternative routes, the land use impact will be equivalent. See Section 8.4, Land Use, for additional information on existing land use, future land designations, and zoning.

Noise. Other than during construction, the alternative natural gas supply line will not produce noise. Therefore, the noise impact from the alternative lines is equivalent to the preferred line.

Public Health. The natural gas supply line has no impact on public health. Therefore, the public health impacts from the preferred gas supply line and the alternative gas supply lines are equivalent.

Worker Health and Safety. The natural gas supply line has no impact on worker health and safety. Therefore, the worker health and safety impacts from the preferred gas supply line and the alternative gas supply lines are equivalent.

Socioeconomics. All of the alternatives and the preferred line are of similar lengths and would require a similar workforce. Therefore, the socioeconomic impacts from the alternatives will be the same as impacts from the preferred natural gas supply line.

Agriculture and Soils. The proposed gas supply line route is located in the county road right-of-way land and will not impact agriculture and soil resources. The alternative routes traverse soil mapping units that are designated as prime agricultural land. However, the installation of the alternative lines is not expected to cause major disturbance or loss of prime agricultural land. The agriculture and soils impact from the preferred line is expected to result in lower impacts to these resources relative to the alternative routes.

Traffic and Transportation. The preferred natural gas supply line will have a minimal impact on traffic and transportation during construction of the line but no impact during operation of the line. The alternative routes will have a slightly lower impact on traffic and transportation because they traverse agricultural land for a majority of the way.

Visual Resources. Since the preferred natural gas supply line and all alternative lines will be underground, there is no visual impact from any of the lines.

Hazardous Materials Handling. The natural gas supply line has no impact on hazardous materials handling. Therefore, the hazardous materials handling impacts from the preferred natural gas supply line and the alternative lines are equivalent.

Waste Management. The natural gas supply line has no impact on waste management. Therefore, the waste management impacts from the preferred natural gas supply line and the alternative lines are equivalent.

Water Resources. The natural gas supply line has no impact on water resources. Therefore, the water resources impacts from the preferred natural gas supply line and the alternative lines are equivalent.

Geologic Hazards and Resources. Because it will be placed underground, the natural gas supply line will have a minimal impact on geologic hazards and resources during the construction period and will be exposed to earthquake disruption during the operating life of the line. The preferred natural gas supply line and the alternative lines are in the same geologic area and are expected to be environmentally equivalent from a geological point-of-view.

Paleontological Resources. The preferred and alternative routes are located in an area with a moderate sensitivity rating because artificial fill material and significant ground disturbance due to roadway, residential, agricultural, or industrial construction activities are present.

9.3.3 Waterlines

There are four alternative waterline routes for water from the BBID take-off point (see Figure 2.1-1). In addition, there are two alternative waterlines for recycled water from the MHCSD WWTP.

9.3.3.1 Waterline Alternatives

Alternative 3a. This alternative is an approximately 2.6-mile pipeline running along Bruns Road, then turning southeast along Byron Bethany Road to the project site.

Alternative 3b. This alternative would run along existing BBID canals to the project site. This alternative is approximately 3.0 miles long.

Alternative 3c. Alternative 3c was an alternative that was considered during project scoping but was determined to have potentially greater environmental impacts than the alternatives presented here. Therefore no further analysis of Alternative 3c is presented.

Alternative 3d. This route runs southward along Bruns to an existing gravel road that runs east to the Delta-Mendota Canal, and then north to Byron Bethany Road along the canal. The pipeline would turn south along Byron Bethany Road and cross Mountain House Road to reach the project site. This preferred route results in a total line of 2.7 miles.

Alternative 3e (Preferred). This alternative is a 2.1-mile pipeline. This route would run southward along Bruns Road to an existing gravel road that runs east to the Delta-Mendota Canal. The pipeline would continue east under the Delta-Mendota Canal via trenchless construction methods, turning south at Mountain House Road to reach the project site.

9.3.3.2 Recycled Waterline Alternatives

Alternative 4a. This alternative is approximately 4.3 miles of pipeline running from the site of the future MHCSD WWTP, west along Bethany Road, northwest along Byron Bethany Road, and west on Kelso Road to the project site.

Alternative 4b (Preferred). Similar to Alternative 4a, this preferred route would be approximately 4.6 miles of pipeline running from the site of the future MHCSD WWTP, west along Bethany Road, and then northwest along Byron Bethany Road to Mountain House Road, then south to the project site.

9.3.3.3 Environmental Considerations

This section addresses the potential environmental impacts of these waterline alternative routes for each of the 16 environmental disciplines.

Air Quality. Except for emissions from construction equipment during the construction phase of the project, the waterlines have no impact on air quality. Therefore, the air quality impacts of the preferred waterline and the alternative waterlines are equivalent.

Biological Resources. Those alternative waterline routes 3a, 3d, and 3e, and 4a and 4b that are either in or adjacent to existing roadways will result in a lower potential for adverse biological impacts. However, these routes could impact vernal pools and associated sensitive biological resources (fairy shrimp), often located in the shoulder areas of the roadways. Impacts to vernal pools can be mitigated to a certain extent or avoided through non-trenching pipeline construction technologies.

Cultural Resources. No known cultural resources were identified along any of the raw waterline routes. However, a number of known cultural resources exist near the recycled waterline routes along the Byron Bethany Road. One recorded site is located near Byron Bethany Road, which is the route for Alternatives 4a and 4b. These sites present a significant potential for cultural resources impacts resulting from the construction of Alternatives 4a and 4b.

Land Use. The preferred waterline and alternative routes all use either street or highway rights-of-way or will require ROW easements across private farmland. The land use impact from the preferred line and the alternative lines is therefore expected to be equivalent.

Noise. Other than during construction, the waterline does not produce noise. Therefore, noise impact from the alternative lines is equivalent to the preferred line.

Public Health. The waterline has no impact on public health. Therefore, the public health impacts from the preferred line and the alternative lines are equivalent.

Worker Health and Safety. The waterline has no impact on worker health and safety. Therefore, the worker health and safety impacts from the preferred line and the alternative lines are equivalent.

Socioeconomics. The assessed value of the alternative lines would be different, depending on the lengths of each line. This difference in assessed value would provide more tax revenues for the longer alternative routes. The difference in tax revenue, if any, is unknown at this time but is expected to be minimal. All other socioeconomic benefits from the alternatives are believed to be the same as for the preferred waterline.

Agriculture and Soils. The preferred waterline and alternative lines all use street or highway rights-of-way or ROW easements across private farmland. Use of any of the line routes will not cause significant disturbance to soils or loss of agricultural-producing land. There will be crop losses resulting from Routes 3b and 4a, which could be mitigated through a negotiated easement payment. The agriculture and soils impact from the preferred and alternative routes is therefore expected to be equivalent.

Traffic and Transportation. The preferred waterline route and the alternative routes will all cause some disruption to traffic flow when trenching across or in roads is necessary. The exception is Route 3b, which is mostly along existing canals. Of the other alternative waterline routes, the preferred route Alternative 3e will probably cause the least disruption to traffic.

Visual Resources. Since the preferred waterline and all alternative lines will be underground, there is no visual impact from any of the lines.

Hazardous Materials Handling. The waterline has no impact on hazardous materials handling. Therefore, the hazardous materials handling impact from the preferred water supply line and the alternative lines is equivalent.

Waste Management. The waterline has no impact on waste management, except for drilling mud resulting from crossing underneath bodies of water. However, the disposal of drilling mud is insignificant. Therefore, the waste management impacts from the preferred waterline and the alternative lines are considered equivalent.

Water Resources. The particular route used for the waterline has no impact on water resources. Therefore, the water resources impact from the preferred water supply line and the alternative lines is equivalent.

Geologic Hazards and Resources. The waterline will have a minimal impact on geologic hazards and resources during the construction period. The line will also be exposed to earthquake disruption during the operating life of the line. The preferred waterline and the alternative lines are in the same geologic area and geologic impacts are expected to be equivalent.

Paleontological Resources. All of the waterline alternatives have the same potential to disturb the unnamed Quanternary alluvium that contains Rancholabrean-age vertebrate fossils elsewhere in this area. Therefore, all of the alternative routes have the potential for paleontological resource impacts.

9.4 Alternative Project Configurations

The proposed nominal 1,100-MW configuration of EAEC is the result of a variety of design and operating considerations. The main factors affecting the configuration include available gas turbine-generator sizes, economies of scale for both construction and operation of the plant, fuel supply logistics, power transmission capacities, and forecast market demand for electrical power. The proposed design configuration consists of the latest generation of commercially demonstrated combustion gas turbine technology, commonly referred to as "F" technology.

Other configurations were investigated including a smaller (500-MW) capacity plant and a design with three combustion turbines and two steam turbines. After thorough review of the engineering, operations, and market considerations, three combustion turbines with one steam turbine providing a nominal 1,100-MW plant capacity configuration was selected as the most viable alternative for EAEC.

9.5 Alternative Technologies

EAEC will not be owned either by a utility or by an affiliate selling to its affiliated utility. EAEC is therefore a "merchant plant," as defined by the CEC in its Electricity Report (CEC, 1995). As a merchant plant, EAEC will be competing with other electricity generators in selling electricity in a deregulated market. Because the ability of EAEC to compete with other generators is paramount to the success of EAEC, the generating technology to be used has therefore been carefully selected. Other technologies were considered using the selection methodology described below, but were rejected in favor of the natural-gas-fired, combined-cycle technology, which is the basis of this application. The selection methodology and other technologies considered are described in the following subsections.

9.5.1 Selection Methodology

Technologies considered were primarily those that could provide base load or load-following power as opposed to those that would provide peak or intermittent power. The reason for using this screening criterion was that the economic viability of the facility depends on its ability to sell as much electricity in the deregulated market as possible. Two intermittent technologies with no fuel cost, solar and wind, were also examined to see if they might be economically viable in the deregulated electricity market.

The selection methodology included a stepped approach with each step containing a number of criteria. The selected technology would have to pass Steps 1 and 2 and provide the lowest or near lowest cost in Step 3. The steps are:

Step 1. Commercial Availability—The technology had to be proven commercially practical with readily available, reliable equipment at an acceptable cost.

Step 2. Implementable—The technology had to be implementable; that is, it could meet environmental, public safety, public acceptability, fuel availability, financial, and system integration requirements.

Step 3. Cost-effective—The technology had to be cost-competitive, not only with existing generating units, but also with units that would likely enter the newly deregulated market near the time EAEC begins commercial operation. Cost included both capital and O&M costs, which would translate into a busbar cost represented in cents per kilowatt-hour.

The methodology was applied to a number of base load and load-following technologies in the following subsections.

9.5.2 Technologies Reviewed

The technologies reviewed can be grouped according to the fuel used. Fuels included were oil and natural gas, coal, nuclear reactions (usually using radioactive materials as fuel), water (hydro, ocean conversion, geothermal), biomass, municipal solid waste, and solar radiation.

9.5.2.1 Oil and Natural Gas

These technologies use oil or natural gas and include conventional boiler-steam turbine units, combustion turbines in various configurations, and fuel cells.

Conventional Boiler-Steam/Turbine. Fuel is burned in a furnace/boiler to create steam, which is passed through a steam turbine that drives a generator. The steam is condensed and returned to the boiler. This is an aging technology, which is able to achieve a maximum thermal efficiency on the order of 35 to 40 percent. Applying the review methodology, the technology is definitely commercially available, and could probably be implemented. Because of its relatively low efficiency, it tends to emit a greater quantity of air pollutants per kilowatt-hour-generated than more efficient technologies. Furthermore, its cost of generation is relatively high, on the order of 5.5 to 7.5 cents per kilowatt-hour, depending on fuel costs. This technology, therefore, does not satisfy Step 3 and was eliminated from consideration.

Supercritical Boiler-Steam/Turbine. This technology is basically the same as the conventional boiler-steam/turbine except that considerably higher pressures are employed. While the efficiency increases, more expensive materials are required to construct the units. Consequently, the cost of power produced is about the same as conventional units. Therefore, this technology was also eliminated.

Simple Combustion Turbine. This technology uses a gas or combustion turbine to drive a generator. Air is compressed in the compressor section of the combustion turbine, passes into the combustion section where fuel is added and ignited, and the hot combustion gases pass through a turbine, which drives a generator and the compressor section of the combustion turbine. The combustion turbines have a relatively low capital cost with efficiencies approaching 40 percent in the larger units. Because they are fast starting and have a relatively low capital cost, they are used primarily for meeting high peak demand (about 1,000 hours/year), when their relatively low efficiency is not a concern. Applying the review methodology, this technology is definitely commercially available, and could be implemented. Because of its relatively low efficiency, it tends to emit a greater quantity of air pollutants per kilowatt-hour-generated than more efficient technologies and its cost of generation if it were base-loaded is relatively high, on the order of 5.5 to 7.5 cents per kilowatt hour, depending on fuel costs. The technology, therefore, does not satisfy Step 3 and was eliminated from consideration.

Conventional Combined-Cycle. This technology integrates combustion turbines and steam turbines to achieve higher efficiencies. The combustion turbine, which drives a generator, would normally exhaust its hot combustion gas to the atmosphere, but in the combined-cycle technology, the exhaust gas is passed through a heat recovery steam generator creating steam, which is used to drive a steam turbine/generator. The resulting efficiency for the system is 50 to 54 percent, considerably above most other alternatives. This relative high efficiency results in lower air emissions per kilowatt-hour-generated and a relatively low cost of 3.5 to 5 cents/kilowatt hour. In addition, natural gas fuel emits little sulfur dioxide and little particulate matter. For these reasons, the system is considered the benchmark against which all other base load technologies are compared. Applying the review methodology, this technology is definitely commercially available and can be implemented. Because of its high efficiency and low cost of generation, this technology satisfies Step 3. This technology is the one selected for EAEC as well as most other new base load and load-following units being developed in the United States.

Kalina Combined-Cycle. This technology is similar to the conventional combined-cycle except water in the heat recovery boiler is replaced with a mixture of water and ammonia. Overall efficiency is expected to be increased 10 to 15 percent. This technology, however, is still in the testing phase with tests recently completed on a 3-MW unit in Southern California. Applying the review methodology, the technology fails to pass Step 1 because it is not commercially available and was, therefore, eliminated from consideration.

Advanced Gas Turbine Cycles. There are a number of efforts to enhance the performance and/or efficiency of gas turbines by injecting steam, intercooling, and staged firing. These include the steam-injected gas turbine (SIGT), the intercooled steam recuperated gas turbine (ISRGT), the chemically recuperated gas turbine (CRGT), and the humid air turbine (HAT) cycle. With the exception of the SIGT, none of the technologies are commercially available and therefore fail to pass Step 1 of the review methodology. The SIGT is marginally commercially available and might pass Steps 1 and 2 of the review methodology, but its efficiency is lower than conventional combined-cycle technology and therefore fails Step 3 of the methodology. Consequently, all of these technologies were eliminated from consideration.

Fuel Cells. This technology uses an electrochemical process to combine hydrogen and oxygen to liberate electrons, thereby providing a flow of current. The types of fuel cells include phosphoric acid, molten carbonate, solid oxide, alkaline, and proton exchange membrane. With the exception of the phosphoric acid fuel cell and possibly the molten carbonate fuel cell, none of these technologies are commercially available and therefore fail Step 1. The phosphoric acid fuel cell has been operated in smaller size units and the molten carbonate fuel cell has completed testing. At this time, however, neither of these technologies are cost-competitive with conventional combined-cycle technology and, therefore, fail Step 3 of the review methodology.

9.5.2.2 Coal

The technologies that use coal for fuel include conventional furnace/boiler steam turbine/generator, fluidized bed steam turbine/generator, integrated gasification combined cycle, direct-fired combustion turbine, indirect-fired combustion turbine, and magnetohydro-dynamics.

Conventional Furnace/Boiler Steam Turbine/Generator. Coal is burned in the furnace/boiler, creating steam that is passed through a steam turbine connected to a generator. The steam is condensed in a condenser, passed through a cooling tower, and returned to the boiler. Designs include stoker, pulverized coal, and cyclone. The efficiency of this technology is equivalent to a conventional gas/oil-fired steam turbine/generator unit (i.e., 35 to 40 percent), but because of the usually lower price of coal compared to natural gas, the technology can be cost-competitive under most conditions. The tons of air emissions per kilowatt-hour-generated by a coal plant are greater than for a conventional combined-cycle because of the composition of coal relative to natural gas and because of the coal plant's lower efficiency, resulting in more fuel consumed per kilowatt hour. Applying the review methodology, the technology is definitely commercially available (Step 1). The technology should be implementable in California except for possible public perception that large coal-fired units cause visible air emissions (untrue with modern units). In addition, coal would have to be imported from outside California (resulting in increased truck and/or train traffic), and the time to construct a facility would probably be about twice that for a conventional combined-cycle unit. The technology may therefore not pass Step 2. In addition, the generation cost of the technology could be greater than for a combined-cycle (Step 3). Because of the potential problems under Step 2 and the potentially higher cost in Step 3, the technology was eliminated from consideration.

Atmospheric and Pressurized Fluidized Bed Combustion. Both of these technologies burn coal in a hot bed of inert material containing limestone that is kept suspended or fluidized by a stream of hot air from below. Water coils within the furnace create steam that drives a steam turbine/generator. The combustion chambers of the pressurized units operate at 150 to 250 psig to increase efficiency. Efficiencies of atmospheric fluidized bed combustion (AFBC) are on the order of 35 to 40 percent, and pressurized units (pressurized fluidized bed combustion [PFBC]) are between 40 and 45 percent. The technology is commercially available for the AFBC technology at least up to the 160-MW size. The PFBC technology is not commercially available. Applying the review methodology, the AFBC may pass Step 1, but the PFBC is eliminated from consideration. Implementation of the AFBC technology in California is possible, particularly for cogeneration applications (several new units have recently been constructed). Coal would have to be imported from outside California, increasing train and truck traffic. The technology should therefore pass Step 2, although possibly not for the 1,100-MW size that the applicant has planned. The generation cost of the technology, however, could be greater than for a combined-cycle (Step 3). Due to the lack of a commercially proven unit in the 1,100-MW range, and the potentially higher cost, the AFBC technology was eliminated from consideration.

Integrated Gasification Combined-Cycle. Integrated gasification combined-cycle (IGCC) gasifies coal to produce a medium Btu gas that is used as fuel in a combustion turbine, which exhausts to a heat recovery steam generator that supplies steam to a steam turbine/generator. The coal gasifier is located at the same site as the combustion turbine, HRSG, and steam turbine/generator and is sized to supply the combustion turbine and integrated with it and the rest of the equipment to provide an integrated generating system. While a 100-MW unit has been fully tested in California, the technology is not yet fully commercially available. Applying the review methodology, the IGCC will not pass Step 1. Implementation of the IGCC technology in California is possible except that coal would have to be imported from outside California (resulting in increased truck and/or train traffic). The generation cost of the technology could be competitive with a conventional gas-fired, combined-cycle (Step 3) but this is a relatively unknown factor. Due largely to the lack of full commercial availability, particularly in the 1,100-MW range, IGCC technology was eliminated from consideration.

Direct- and Indirect-Fired Combustion Turbines. Direct-fired units burn finely powdered coal directly in the combustion chamber of the combustion turbine while indirect-fired units burn the coal in a fluidized bed or other combustor, and use a heat exchanger to transfer the heat from the combustion gases to air, which is then expanded through the turbine. Neither of these units is commercially available; they therefore fail to pass Step 1 of the selection methodology and were eliminated from consideration.

Magnetohydrodynamics. High temperature (3,000 ºF) combustion gas is ionized and passed through a magnetic field to directly produce electricity. This technology is not commercially available; therefore, it fails to pass Step 1 of the review methodology and was eliminated from consideration.

9.5.2.3 Nuclear

This technology includes nuclear fission and nuclear fusion. Nuclear fission breaks atomic nuclei apart, giving off large quantities of energy. For nuclear fission, pressurized water reactors (PWRs) and boiling water reactors (BWRs) are commercially available. Also for nuclear fission, there are high-temperature gas cooled reactors (HTGCRs) and liquid metal fast-breeder reactors (LMFBRs), which are not commercially available. While nuclear fission is a viable base load technology heavily used in France and Japan, it is currently out of favor politically in the United States and particularly in California. In addition, California law prohibits new nuclear plants until the scientific and engineering feasibility of disposal of high-level radioactive waste has been demonstrated. To date, the CEC is unable to make the findings of disposal feasibility required by law for this alternative to be viable in California. The technology therefore is not implementable and fails to pass Step 2 of the review methodology. The technology was therefore eliminated from consideration.

Nuclear fusion forces atomic nuclei together at extremely high temperatures and pressures, giving off large quantities of energy. Nuclear fusion is not available commercially and it is not clear if, or when, it will become available. The technology, therefore, fails to pass Step 1 of the review methodology and was eliminated from consideration.

9.5.2.4 Water

These technologies use water as "fuel," and include hydroelectric, geothermal, and ocean energy conversion.

Hydroelectric. This technology uses falling water to turn turbines that are connected to generators. A flowing river, or more likely a dammed river, is required to obtain the falling water. This technology is commercially available. Most of the sites for hydroelectric facilities have already been developed in California and any remaining potential sites face formidable environmental licensing problems. It is doubtful that this technology could be implemented and it would therefore fail to pass Step 2 of the review methodology. If a proposed project could pass Step 2, the cost would probably be considerably higher than the cost of a conventional combined-cycle, which would cause its elimination under Step 3 of the review methodology. It was therefore eliminated from consideration.

Geothermal. These technologies use steam or high-temperature water (HTW) obtained from naturally occurring geothermal reservoirs to drive steam turbine/generators. There are vapor-dominated resources (dry, super-heated steam), and liquid-dominated resources (HTW), which use a number of techniques to extract energy from the HTW. Geothermal is a commercially available technology. However, geothermal resources are limited, and most if not all economical resources have been discovered and developed in California. Calpine is in the process of developing a geothermal project at the Glass Mountain Known Geothermal Resource Area (KGRA) in Siskiyou County. Geothermal development is not viable in the Central Valley region served by the EAEC project.

Ocean Energy Conversion. A number of technologies use ocean energy to generate electricity. These include tidal energy conversion, which uses the changes in tide level to drive a water turbine/generator; wave energy conversion, which uses wave motion to drive a turbine/generator; and ocean thermal energy conversion, which employs the difference in water temperature at different depths to drive an ammonia-cycle turbine/generator. While all of these technologies have been made to work, they are probably not fully commercially available. Even if they were commercially available, they are considerably more costly than conventional combined-cycle technology and they would therefore fail Step 3 of the review methodology. They were therefore eliminated from consideration.

9.5.2.5 Biomass

Major biomass fuels include forestry and mill wastes, agricultural field crop and food processing waste, and construction and urban wood wastes. Several techniques are used to convert these fuels to electricity, including direct combustion, gasification, and anaerobic fermentation. While these technologies are available commercially on a limited basis, their cost tends to be high relative to a conventional combined-cycle unit burning natural gas. This technology, therefore, does not pass Step 3 of the review methodology and was eliminated from consideration.

Municipal solid waste (MSW) consists of extracting energy from garbage by burning or other means such as pyrolysis or thermal gasification and is commonly referred to as waste-to-energy (WTE). The best-known methods incorporate mass burn and refuse-derived fuel (RDF) facilities. Both mass burn and RDF are commercially available methods of MSW technology. Other methods are co-firing with coal, using fluidized-bed furnace/boilers, and pyrolysis or thermal gasification. There is only one 10-MW mass burn unit operating in California and no RDF facilities or facilities using the other methods. The economic feasibility of MSW technology depends heavily on the level of the "tipping fee" in the vicinity of the MSW facility. The tipping fee is the price charged by landfills for depositing waste or garbage in the landfill, and it is usually expressed in dollars per ton. In effect, a waste collection company would pay the WTE facility for taking and burning its garbage, resulting in a negative fuel cost to the WTE. A recent study for development of a WTE facility in the San Francisco area estimated that the tipping fee would have to be approximately $80 per ton for a facility to be economical. The current market tipping fee in the area ranges from $30 to $40 per ton. This technology therefore fails to satisfy Step 3 of the review methodology, which requires the technology to be cost-competitive. This technology was therefore eliminated from consideration.

9.5.2.6 Solar

Radiation. Solar radiation (sunlight) can be collected directly to generate electricity with solar thermal and solar photovoltaic technologies or indirectly through wind generation technology in which the sunlight causes thermal imbalance in the air mass, creating wind. Wind generation and two types of solar generation, thermal conversion and photovoltaics, were considered as alternative technologies to the combined-cycle. These are described in the following subsections.

Thermal. Most of these technologies collect solar radiation, heat water to create steam, and use the steam to power a steam turbine/generator. The primary systems that have been used in the United States capture and concentrate the solar radiation with a receiver. The three main receiver types are mirrors located around a central receiver (power tower), parabolic dishes, and parabolic troughs. Another technology collects the solar radiation in a salt pond and then uses the heat collected to generate steam and drive a steam turbine/generator. While one of these technologies might be considered to be marginally commercial (parabolic trough), the others are still in the experimental stage. All require considerable land for the collection receivers and are best located in areas of high solar incidence. In addition, power is only available while the sun shines so the units do not supply power when clouds obscure the sun or from early evening to late morning. These factors translate into high cost, on the order of 6 to 12 cents per kilowatt-hour, which is well above the market generation price of 3 to 4 cents per kilowatt-hour in January 1998. These systems for the most part fail Step 1, commercial availability, and may not be implementable due to land unavailability and/or the ability to finance. They all, however, fail in being cost-effective and therefore were eliminated from consideration.

Photovoltaic. This technology uses photovoltaic "cells" to convert solar radiation directly to direct current electricity, which is then converted to alternating current. Panels of these cells can be located wherever sunlight is available. This technology is environmentally benign and is commercially available, since panels of cells can theoretically be connected to achieve any desired capacity. While this technology may have a bright future, at the current time the cost is very high, on the order of 15 to 25 cents per kilowatt-hour. The technology fails Step 3, cost-effectiveness, and was therefore eliminated from consideration.

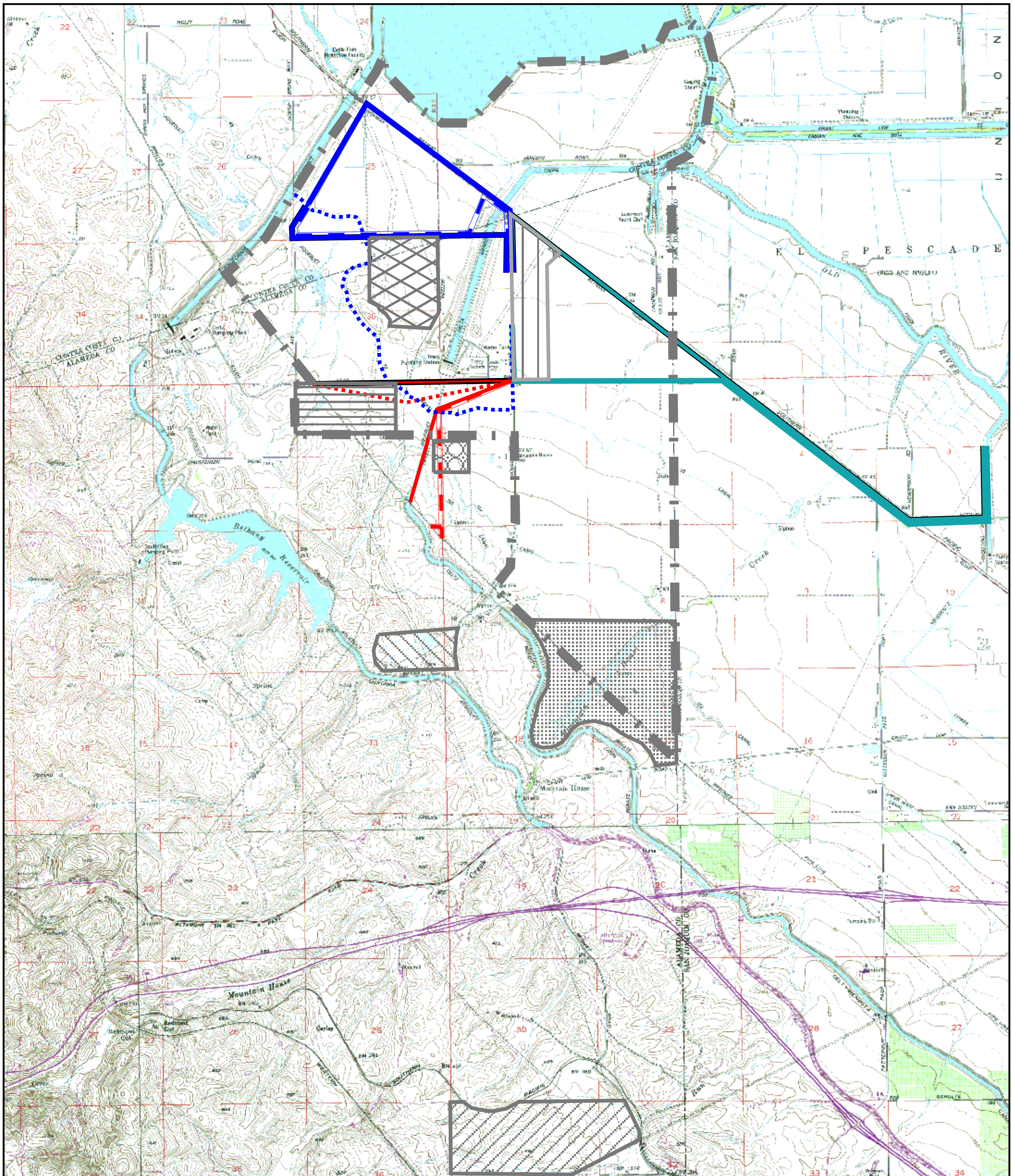
Wind Generation. This technology uses a wind-driven rotor (propeller) to turn a generator and generate electricity. Only certain sites have adequate wind to allow for the installation of wind generators and most of the sites that have not been developed are remote from electric load centers. Because even in prime locations the wind does not blow continuously, capacity from this technology is not always available. In California, the average wind generation capacity factor has been 15 to 30 percent. In addition, the technology cannot be depended upon to be available at system peak load since the peak may occur when the wind is not blowing. The technology is commercially available and probably implementable at the proposed sites, although financing may not be available due to its perceived risk. The technology is relatively benign environmentally although visual impacts, land consumption, and effects on raptors are a concern. The cost of generation is on the order of 5 to 10 cents per kilowatt-hour, which is above the cost of the preferred alternative.

9.5.3 Conclusions

All feasible technologies that might be available for base load and load-following operation in California were reviewed using a methodology that considered commercial availability, ability to implement, and cost-effectiveness. Although some technologies, other than the combined-cycle burning natural gas, were commercially available and could be implemented, most would not result in fewer environmental effects than the natural-gas-fired, combined-cycle. In addition, all alternatives, commercially available, implementable technologies were less cost-effective than the combined-cycle, and would therefore not be competitive in the deregulated electricity market. Therefore, the conventional combined-cycle technology using natural gas as fuel is the best available technology and the one that should be employed for EAEC.

9.6 References

California Energy Commission. 1995. 1994 Biennial Electricity Report (ER94), P300-95-002. November.



LEGEND

PROJECT SITE
SITE 1
SITE 2
SITE 3
SITE 4
SITE 5
SITE 6

GAS
2A PREFERRED
2C
2D
2E

WATER
3A
3B
3D
3E PREFERRED

BBID SERVICE AREA

RECLAIMED WATER
4A
4B PREFERRED

N

3000 0 3000 Feet

SCALE IS APPROXIMATE

FIGURE 9.1-1
ALTERNATIVE SITES CONSIDERED

APPLICATION FOR CERTIFICATION
FOR EAST ALTAMONT ENERGY CENTER

CH2MHILL

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10.0 Engineering

In accordance with CEC regulations, this section, together with the Engineering appendices and Sections 6.0 and 7.0, presents information concerning the design and engineering of the EAEC. Section 10.1 describes the design of the facility with reference to Section 2.0, the Project Description. Section 10.2 discusses the reliability of the EAEC. Section 10.3 presents the estimated thermal efficiency of the facility. Section 10.4 describes the LORS applicable to the engineering of EAEC and identifies agencies that have jurisdiction and the contact persons within those agencies.

10.1 Facility Design

A detailed description of the EAEC project is provided in Section 2.2, Generating Facility Description, Design, and Operation. Design for safety is provided in Section 2.3, Facility Safety Design.

A geotechnical assessment of the proposed site has not been performed, but is scheduled to be performed during the second calendar quarter of 2001. The full report will be provided in 10 copies to the CEC when it becomes available.

Summary descriptions of the design criteria are included in the following appendices:

- Appendix 10A, Civil Engineering Design Criteria
- Appendix 10B, Structural Engineering Design Criteria
- Appendix 10C, Mechanical Engineering Design Criteria
- Appendix 10D, Electrical Engineering Design Criteria
- Appendix 10E, Control Engineering Design Criteria
- Appendix 10F, Chemical Engineering Design Criteria

Design and engineering information and data for the following systems are found in the following sections of the AFC:

- **Power Generation** - See Section 2.2.4, Combustion Turbine Generators, Heat Recovery Steam Generators, Steam Turbine Generator and Condenser, and Auxiliary Boiler. Also see Appendix 10C and Sections 2.2.5 through 2.2.9, which describe the various plant auxiliaries.

- **Heat Dissipation** - See Section 2.2.8, Plant Cooling Systems, and Appendix 10C.

- **Cooling Water Supply System** - See Section 2.2.7, Water Supply and Use; Section 2.2.7.5, Water for the Circulating Water System; Section 2.2.7.5, which describes other water systems, and Appendix 10F.

- **Air Emission Control System** - See Section 2.2.11, Emission Control and Monitoring, and Section 8.1, Air Quality.

- **Waste Disposal System** - See Section 2.2.9 and Section 8.13, Waste Management.

- **Noise Abatement System** -See Section 8.5, Noise.
- **Switchyards/Transformer Systems** -See Section 2.2.5, Major Electrical Equipment and Systems; Section 2.2.13.2 Grounding; Section 2.2.5.1, AC Power-Transmission; Section 2.2.14, Interconnect to Transmission Line; Section 5.0, Electric Transmission; and Appendix 10D.

10.2 Facility Reliability

This section discusses the availability of fuel, and the expected service life of the plant and the degree of reliability to be achieved by the EAEC.

10.2.1 Fuel Availability

Natural gas will be purchased from numerous gas suppliers and delivered to the EAEC by PG&E. PG&E is the major transporter of natural gas in northern California, delivering gas from both Canada and the southwest United States to customers on its system. Purchases of natural gas may be aggregated into a common portfolio and delivered on PG&E's transmission system to a delivery point at the interconnection of PG&E's transmission system and the physical supply line to the EAEC. The supply line will commence at PG&E's Line 401 located 1.4 miles west of the EAEC and terminating at the EAEC (see Section 6.0). PG&E's Line 401 is a major, high-pressure backbone transmission line capable of delivering the required quantity of gas to the EAEC. It is conceivable that PG&E's line or the line from the PG&E interconnect point to the EAEC could become temporarily inoperable due to a breach in the lines or from other causes, resulting in fuel being unavailable at the EAEC. The EAEC has no backup supply of natural gas and would, therefore, have to be shut down until the situation was corrected.

10.2.2 Plant Availability

The EAEC will be a merchant facility; it will operate as dictated by contractual power supply obligations and the relative cost of power generation from the facility. Due to the relatively high efficiency of the EAEC, it is anticipated that the facility will operate at high average annual capacity normally. The EAEC will be designed to operate between approximately 23 and 100 percent of baseload to support dispatch service. The EAEC will be designed for an operating life of 30 years. Reliability and availability projections are based on this operating life. Operation and maintenance procedures will be consistent with industry standard practices to maintain the useful life status of plant components.

The EAEC combined-cycle power block will consist of three natural-gas-fired CTGs, three HRSGs with natural-gas-fired duct burners, and one STG (three-on-one combined-cycle configuration). Secondary process steam demands will be provided by the combined-cycle steam or by a gas-fired auxiliary boiler. An emergency generator will support auxiliary boiler operation and other uses when utility power is not available.

The combined-cycle power block is projected to operate between 50 and 100 percent of the time during each of the 30 years. The HRSG duct burners are projected to operate up to 58 percent of the time during each of the 30 years. The percent of time that the combined-cycle power block and the HRSG duct burners are projected to operate is defined as the "service factor." The service factor considers the amount of time that a unit is operating and generating power, whether at full or partial load. The projected service factor for the combined-cycle power block and the HRSG duct burners, which considers projected percentage of time of operation, differs from the "equivalent availability factor" (EAF), which considers the projected percentage of energy production capacity achievable. EAF is defined as a weighted average of the percentage of full energy production capacity achievable. The projected EAF for the EAEC is estimated to be in the range of 92 to 98 percent. The EAF differs from the "availability of a unit," which is the percentage of time that a unit is available for operation, whether at full load, partial load, or standby.

Cooling tower and process makeup for the EAEC will initially be raw water from the BBID. The EAEC will be designed to use recycled water for cooling tower makeup. Domestic water will be supplied from either an onsite well or else through connection to the existing domestic water system that supplies water to the federal facilities located west of the site. Process makeup water and water for domestic use at the EAEC will be treated as necessary at the EAEC site prior to use.

Waste disposal consists of the nonhazardous concentrated brine discharged to onsite evaporation ponds. Sanitary sewer wastes will be discharged to an onsite septic tank/leach system. Solid waste will be collected by the local non-hazardous waste collector. Most hazardous wastes will be collected and recycled by permitted recycling firms, and non-recyclable hazardous wastes will be collected by a licensed hazardous waste hauler and deposited in a hazardous waste landfill. For detailed information on the use of hazardous materials and management of wastes, see Sections 8.12 and 8.13.

There are no known geologic hazards other than the remote possibility of a major earth-quake (see Section 8.15).

Special design features are included in the EAEC design to ensure power plant reliability, including redundancy of critical components (see Section 2.4.2, Redundancy of Critical Components).

Deterioration of output capacity and efficiency of the EAEC over time, called degredation, is expected to be on the order of 2 to 3 percent over a 3-year period. Cleaning, maintenance, or overhaul will recapture most of the loss. Over the expected 30-year life of the facility, the estimated total, nonrecovered loss in output and efficiency will be on the order of 1 to 2 percent.

10.3 Thermal Efficiency

The maximum thermal efficiency that can be expected from a large natural-gas-fired combined-cycle plant is approximately 55 to 57 percent. This level of efficiency is achieved when a facility is base-loaded. Other types of operations, particularly those at less than full gas turbine output, will result in lower efficiencies. The basis of EAEC operations will be primarily (1) the current prevailing market rate for spot power, and (2) pre-established contractual obligations to provide electricity to customers. Potential operating scenarios for the plant vary from a very low facility capacity factor to an essentially baseload plant. The number of plant startup and shutdown cycles is expected to range between zero and 300 per year per CTG. The number of hot startups versus cold startups cannot be predicted at this time.

Plant fuel consumption will depend on the operating profile of the power plant. It is estimated that the range of fuel consumed by the power plant will be from a minimum of near zero British thermal units (Btu) per year to a maximum at baseload.

Normal offline fuel consumption is 50 to 120 million Btu/hr.

The net electrical production of the EAEC cannot be accurately forecast at the present time given the merchant nature of the plant. The maximum annual generation possible from the facility is estimated to be between 7,125 and 7,655 gigawatt hours (GWh) per year. The amount of startup and shutdown power generation can also only be estimated. The range of possible startup/shutdown generation begins near zero MWh per year and increases to a maximum of 140 to 220 GWh per year.

The number of hours that the EAEC will be operated at a variety of logical load points will depend ultimately on power market conditions.

10.4 Laws, Ordinances, Regulations, and Standards

10.4.1.1 General LORS

The following LORs are generally applicable to the project:

- Uniform Fire Code, Article 80
- Occupational Safety and Health Act – 29 CFR 1910 and 29 CFR 1926
- Environmental Protection Agency – 40 CFR 60, 40 CFR 75, 40 CFR 112, 40 CFR 302, 40 CFR 423, 40 CFR 50, 40 CFR 100, 40 CFR 260, 40 CFR 300, and 40 CFR 400
- California Code of Regulations – Title 8, Sections 450 and 750 and Title 24, 1995, Titles 14, 17, 19, 20, 22, 23, and 26
- California Department of Transportation – Standard Specifications
- California Occupational Safety and Health Administration – Regulations and Standards
- California Business and Professions Code – Sections 6704, 6730, and 6736
- California Vehicle Code – Section 35780
- California Labor Code – Section 6500
- Federal Aviation Agency – Obstruction Marking and Lighting AC No. 70/7460-1H
- Alameda County – Regulations and Ordinances

Codes and standards pertinent to the generating facility are presented in Engineering Appendices 10A through 10G.

The applicable local LORS and local agency contacts involved in administration and enforcement are described below.

10.4.2 Local LORS

The Alameda County Zoning Ordinances require that zoning approval be obtained to ensure that each new or expanded use or structure complies with County zoning requirements. The EAEC site zoning is consistent for the development of a generating facility (see Section 8.4, Land Use).

The EAEC site is located in an unincorporated portion of Alameda County, and will therefore be subject to all applicable regulations of Alameda County.

10.5 Local Agency Contacts

Table 10.4-1 lists local agency contacts.

TABLE 10.4-1
Local Agency Contacts

Agency	Contact	Title	Telephone
Alameda County Fire Department	James Ferdinand	Fire Marshal	925/833-6628
Alameda County Community Development Agency	Adolph Martinelli	Agency Director	510/670-5333
Alameda County Community Development Agency	James Sorensen	Planning Director	510/670-5400
Alameda County Community Development Agency	Bruce Jensen	Planner	510/670-5400
Alameda County Health Agency	Ronald Torres, R.E.H.S.	Supervising Environmental Health Specialist	510/567-6700

10.6 Local Permits Required and Permit Schedule

After the receipt of zoning approval and the approval of project design, several permits will be required. These include a Building Permit, a Grading Permit, and a Certificate of Occupancy. These three permits are described in Alameda County's Municipal Ordinance.